U.S. VEHICLE FIRE TRENDS AND PATTERNS

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Introduction

In this report, trends and characteristics associated with vehicle fires are examined by using data from the National Fire Protection Association's (NFPA's) annual fire experience survey and the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS). The report examines characteristics of vehicle fires that might lead to vehicle redesigns or changes in the actions of civilians and fire departments alike. The layout of the report is dictated by various classes of vehicles: data on road, rail, water, air and other vehicle types are displayed separately to distinguish their differences. Specifically, information is given on the leading causes of vehicle fires, as well as the leading areas of origin and forms and types of material first ignited. Additional data is provided on the fire trends, as well as location, month, day, and time patterns.

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Overview of the Vehicle Fire Problem

329,500 vehicle fires, 565 civilian deaths, 1,825 civilian injuries were reported in 2002.
Public fire departments responded to 329,500 vehicle fires in the United States during 2002. These fires caused 565 civilian deaths, 1,825 civilian injuries and $1,392,000,000 in direct property damage. (See Table 1.) Vehicle fires accounted for 20% of the 1,687,500 fires reported to U.S. fire departments that year. In that same year, vehicle fires caused 17% of all civilian fire deaths, 10% of all civilian fire injuries and 13% of the nation's property loss to fire. More people died from vehicle fires than from apartment fires, and vehicle fires caused seven times the number of deaths caused by non-residential structure fires.[1]

Vehicle fires fell to a record low.
The total number of reported vehicle fires fell 6% from the 351,500 reported in 2001 to 329,500 in 2002. This was the smallest vehicle fire incidence since the National Fire Protection Association (NFPA) began tracking vehicle fires and losses with its current methods. After declining in the early eighties, vehicle fires began increasing in 1983 to a peak of 477,500 in 1988. The 9% drop from 1988 to 1989 was the largest seen since NFPA began tracking this data. Since 1980, reported vehicle fires have fallen 30%, compared to a 51% drop in reported structure fires and a 44% drop in fires of all types. Figure 1 shows the trend in vehicle fires since 1980.

As shown in Figure 2a, the death toll due to vehicle fires fluctuates greatly from year to year. Vehicle fire deaths rose 16% from 485 in 2001 to 565 in 2002. A generally downward trend can be seen in the five-year rolling averages shown in Figure 2b. Only fires and fire deaths reported to local public fire departments in the United States are counted. Fires or fire deaths on the open seas are not captured in these statistics.

Civilian injuries in vehicle fires fell 5% from 1,925 in 2001 to 1,825 in 2002, the second lowest point since tracking began. (See Figure 3.)

2002 data came from the NFPA Fire Experience Survey.
The NFPA Fire Analysis and Research Division uses two data sources in most of its analyses. The first, the NFPA Annual Fire Experience Survey, provides an overview of the fire experience in the previous year. Each year, all large departments serving populations over 100,000 and one-third of the smaller departments, in a sample stratified by size, are asked about their fire and firefighter injury experience. The final sample of respondents contains roughly one-tenth of all local fire departments. A summary of the fire experience for the previous year is issued each fall. The 2002 data cited in this report came from the NFPA survey.

[1] Michael J. Karter, Jr., *Fire in the United States During 2002,* Quincy, MA: NFPA, September 2003. This report summarizes the results of the NFPA Annual Fire Department Survey and is the source for 2002 statistics.

NFIRS data provided the details.
The survey provides the big picture; data from the National Fire Incident Reporting System (NFIRS) fill in the details. Local fire officers complete fire reports describing the facts of the incident – the when, where, what and how of each fire. These reports (or data from these reports) are forwarded to state offices. After the states compile and process the data, they forward it to the U.S. Fire Administration (USFA). This is the largest, most detailed source of incident information about fire. Unfortunately, this data is not available as early as the data from the survey. At the time this report was written, the most current available NFIRS data was from 1999.

NFIRS and the NFPA survey were used to develop national estimates.
Because some states and some departments do not participate in the system, the raw NFIRS numbers would dramatically underestimate the extent of the fire problem. Total fires, casualties and losses reported to NFIRS are compared to those found in the NFPA Survey. Scaling ratios are then derived to apply to the raw NFIRS numbers to develop national estimates. Analysts from the USFA, the U.S. Consumer Product Safety Commission (CPSC) and the NFPA developed this method of calculating national estimates. A more detailed description of this methodology is found in the appendix.

Version 5.0 of NFIRS prompts changes in the analysis.
The USFA began introducing Version 5.0 of NFIRS in 1999, and the entire 1999 database was received in that format. More than 90% of the fires reported in 1999 were collected in an older version and converted to Version 5.0. Because of the significant differences between Version 5.0 and earlier versions, it is generally advisable to analyze 1999 data separately from previous years. Consequently, separate tables are provided showing 1999 data and 1994-1998 annual averages. The 1999 data is the most current, but five-year averages are less likely to skewed by unusual events.

Certain rule and definition changes also make comparisons difficult. In the past, incendiary and suspicious fires were identified by the ignition factor. In Version 5.0, a new field, Cause (called Broad Cause in this report), captures whether a fire was "intentional," "unintentional," the result of a "failure of equipment or heat source," or an "act of nature." The type of material first ignited is no longer required when the item first ignited falls under the category of general or organic materials. Consequently, tables showing the types of material first ignited were not updated for 1999. Three-digit incident type codes can broadly identify types of vehicle fires. However, all vehicle fires from previous years convert to "other vehicle fire." Although mobile property type is no longer required if a vehicle burned but was not involved in the ignition, it was present in the vast majority of fires and is used to identify the types of vehicles that burned.

Five categories of vehicles are discussed in this report.
The remainder of this report details the causes of fires, civilian deaths and injuries, and direct property damage in five separate mobile property classes, as defined by NFIRS. Table 2 gives an overview of fire experience by general class of mobile property. About four of every five vehicle fires involved highway vehicles. To prevent this category of vehicles from obscuring patterns in other types of vehicles, the rest of this report has been

divided into sections specific to each class of vehicle. The broad categories are listed below:

Code	Mobile Property Type
10 - 29	Highway vehicles
30 - 39	Rail transport vehicles
40 - 49	Water transport vehicles
50 - 59	Aircraft
60 - 79	Industrial, agricultural, construction, special and miscellaneous vehicles.

Except for overall trends and type of material first ignited, the report shows 1999 data and 1994-1998 annual averages.
Most of the tables in the remainder of the report show national estimates based on a) 1999 data and b) annual averages of data from 1994 through 1998. The first table in each section shows fires and associated losses by year. The second shows the annual averages of fires, civilian deaths and injuries, and direct property damage for each type of vehicle in that category. Subsequent tables show patterns by month, day of week and time of day. These are followed by tables on the fixed property use and the causal factors: factor contributing to ignition or ignition factor, broad cause, ignition factor grouping, area of origin, item or form of material first ignited and type of material first ignited.

It is important to remember that there is a certain amount of overlap in the fire cause categories. A short circuit or a part failure may have occurred because the car was not maintained properly or something had worn out. A mechanical malfunction or failure may have resulted from poor maintenance or improper use, or it could be a manufacturer's defect.

Department of Transportation (DOT) has regulatory authority.
The Department of Transportation (DOT) and its divisions regulate vehicles. Questions about regulations or specific makes and models should be addressed to the DOT or its subdivisions. Larry Strawhorn's chapter on "Motor Vehicles" in the nineteenth edition of NFPA's *Fire Protection Handbook* provides information on the agencies, regulations and standards that pertain to vehicle fires, details on vehicle systems and hazards, information on tank trucks and a bibliography for further reading.

The National Highway Traffic Safety Administration (NHTSA) of DOT is authorized to set minimum safety standards for new motor vehicles and motor vehicle equipment and to investigate defects in motor vehicles, including fire hazards. It may order recalls when necessary.

Since its inception in 1966, the NHTSA has issued four fire-safety standards for new motor vehicles. The Federal Motor Vehicle Safety Standard (FMVSS) 301 was developed to reduce the danger from fuel leakage following crashes involving cars, trucks and buses weighing less than 10,000 pounds.

Federal Motor Vehicle Safety Standard 302 sets flammability standards for the materials used in the driver and passenger area of vehicles. This standard aims to reduce the danger of interior fires caused by matches or smoking. The other two standards address vehicles using compressed natural gas.[2]

Multiple strategies are needed to reduce losses from vehicle fires.
The thrust of efforts to prevent fire and associated losses in the United States has primarily been in making structures (and their occupants and contents) less fire-prone and more fire-safe. The emphasis in home fire safety has focused on installing smoke alarms and home fire sprinklers, redesigning products, and educating the public to take action to protect themselves through fire safety and fire prevention messages. Building codes and standards, safety guidelines, fire detection equipment, and sprinklers have all contributed to more fire-safe non-residential structures.

The fire community has given only intermittent attention to vehicle fires, and that attention has typically focused narrowly on major multiple-death incidents. As in buildings, most of the deaths occur in ones and twos and in private settings, like a family car. Attempts to further reduce fires and their related losses necessitate strategies that reduce both the occurrence and the severity of vehicle fires.

Vehicle fires are a major component of the fire death problem. About three-quarters of vehicle fire deaths resulted from highway vehicles fires, with the largest share resulting from automobile fires. Additional and more in-depth fire testing of automobiles would increase our knowledge of how these fires develop. This detailed information would provide engineers with the information needed to develop solutions to the automobile fire death problem (similar to the advances, such as the airbag, which have resulted from collision testing). Through redesign, we can produce more fire-safe automobiles.

In most categories of vehicles, fire deaths occur in fires following survivable collisions. Additional reductions in vehicle fire deaths may result from public safety programs and studies designed to reduce the number of collisions that occur in the United States. This two-pronged approach would very likely produce a positive impact on the vehicle fire death problem. The NFPA is a partner in Healthy People 2010. Several objectives pertain to deaths and injuries from motor vehicle crashes. Reducing deaths and injuries from motor vehicle crashes in general and from alcohol-related crashes, reducing the proportion of adolescents who rode with a driver who had been drinking, and making the maximum blood alcohol concentration 0.08% for drivers over 21 years old could decrease the number of people who are killed by fires caused by collisions.[3]

The National Transportation Safety Board released its *Evaluation of U.S. Department of Transportation Efforts in the 1990s to Address Operator Fatigue* in May of 1999. The

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[2] Larry Strawhorn, "Motor Vehicles," *Fire Protection Handbook*, 19th edition, Section 14, Chapter 1, p.14-5, Quincy, MA: NFPA, 2003.
[3] Task Force on Community Preventive Services, "Motor-Vehicle Occupant Injury: Strategies for Increasing Use of Child Safety Seats, Increasing Use of Safety Belts, and Reducing Alcohol-Impaired Driving." *MMWR Recommendations and Reports*, May 18, 2001, from http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5007a1.htm.

U.S. Department of Transportation began conducting research on operator fatigue in transportation in 1989. Several transportation agencies have developed public education materials on the subject. Although fatigue is an acknowledged factor in transportation incidents, it was felt that the hours-of-service regulations do not incorporate the latest research findings on fatigue and sleep. The report makes recommendations for improved regulations in this area to several federal agencies involved in transportation. However, these regulations would not apply to the private individual in a personal vehicle.[4]

It is hoped that the information in this report will help individuals, industry and regulatory bodies to devise new ways to lessen the vehicle fire problem.

[4] National Transportation Safety Board, *Safety Report – Evaluation of U.S. Department of Transportation Efforts in the 1990s to Address Operator Fatigue,* Washington, D.C.: NTSB/SR-99/01, PB99-917002, Notation 7155, May 1999, pp. 25-28, from http://www.ntsb.gov/publictn/1999/SR9901.pdf.

Table 1. U.S. Vehicle Fire Problem, by Year: 1980-2002

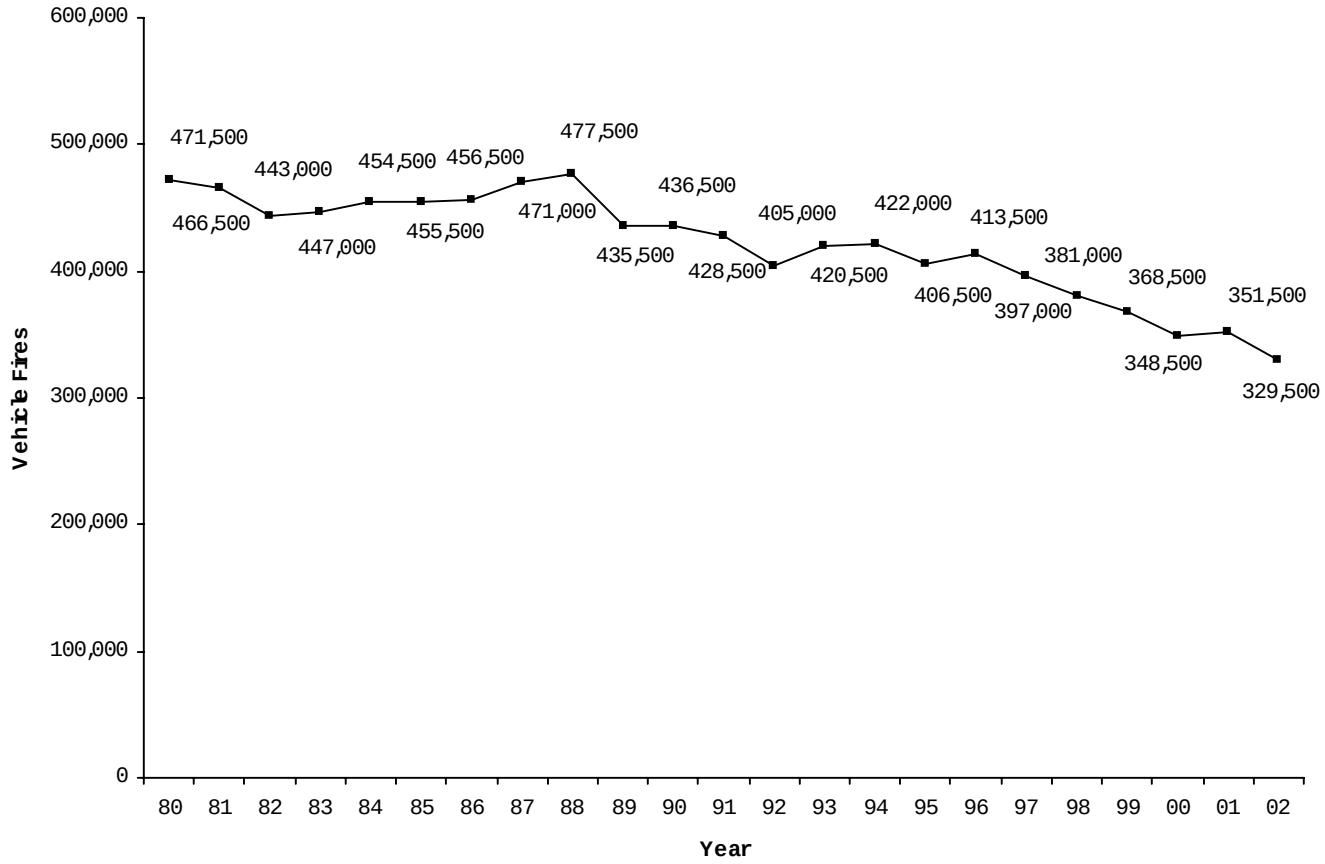
Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)	Loss in 2002 Dollars
1980	471,500	740	4,075	$685	$1,497
1981	466,500	840	3,400	$594	$1,173
1982	443,000	695	3,425	$591	$1,100
1983	447,000	725	3,800	$694	$1,252
1984	454,500	630	3,600	$749	$1,295
1985	455,500	825	3,600	$792	$1,322
1986	456,500	735	3,125	$783	$1,286
1987	471,000	805	3,150	$842	$1,333
1988	477,500	865	2,950	$941	$1,432
1989	435,500	685	3,025	$963	$1,398
1990	436,500	695	3,350	$967	$1,332
1991	428,500	605	3,050	$1,049	$1,385
1992	405,000	730	3,000	$965	$1,237
1993	420,500	595	2,675	$1,030	$1,282
1994	422,000	630	2,625	$1,111	$1,349
1995	406,500	535	2,525	$1,152	$1,359
1996	413,500	710	2,225	$1,333	$1,530
1997	397,000	480	2,125	$1,269	$1,422
1998	381,000	575	2,225	$1,337	$1,476
1999*	368,500	470	1,850	$1,324	$1,429
2000	348,500	465	1,600	$1,381	$1,443
2001	351,500	485	1,925	$1,512	$1,536
2002*	329,500	565	1,825	$1,392	$1,392
1980-2002 Annual average	421,100	656	2,833	$1,020	$1,359
1998-2002 Annual average*	356,000	512	1,885	$1,389	$1,455

* Data from the NFPA survey gives us the statistics on total vehicle fires for 2002. The analyses that follow use NFIRS data to provide the detail. The 1999 NFIRS data is the most recent available, but changes introduced with Version 5.0 of NFIRS can make it advisable to analyze 1999 data separately from earlier years. Consequently, the rest of this report shows two sets of tables: five-year annual averages from 1994 through 1998, and 1999.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires were estimated to the nearest five hundred, civilian deaths to the nearest five, civilian injuries to the nearest twenty-five, and direct property damage was rounded to the nearest million dollars.

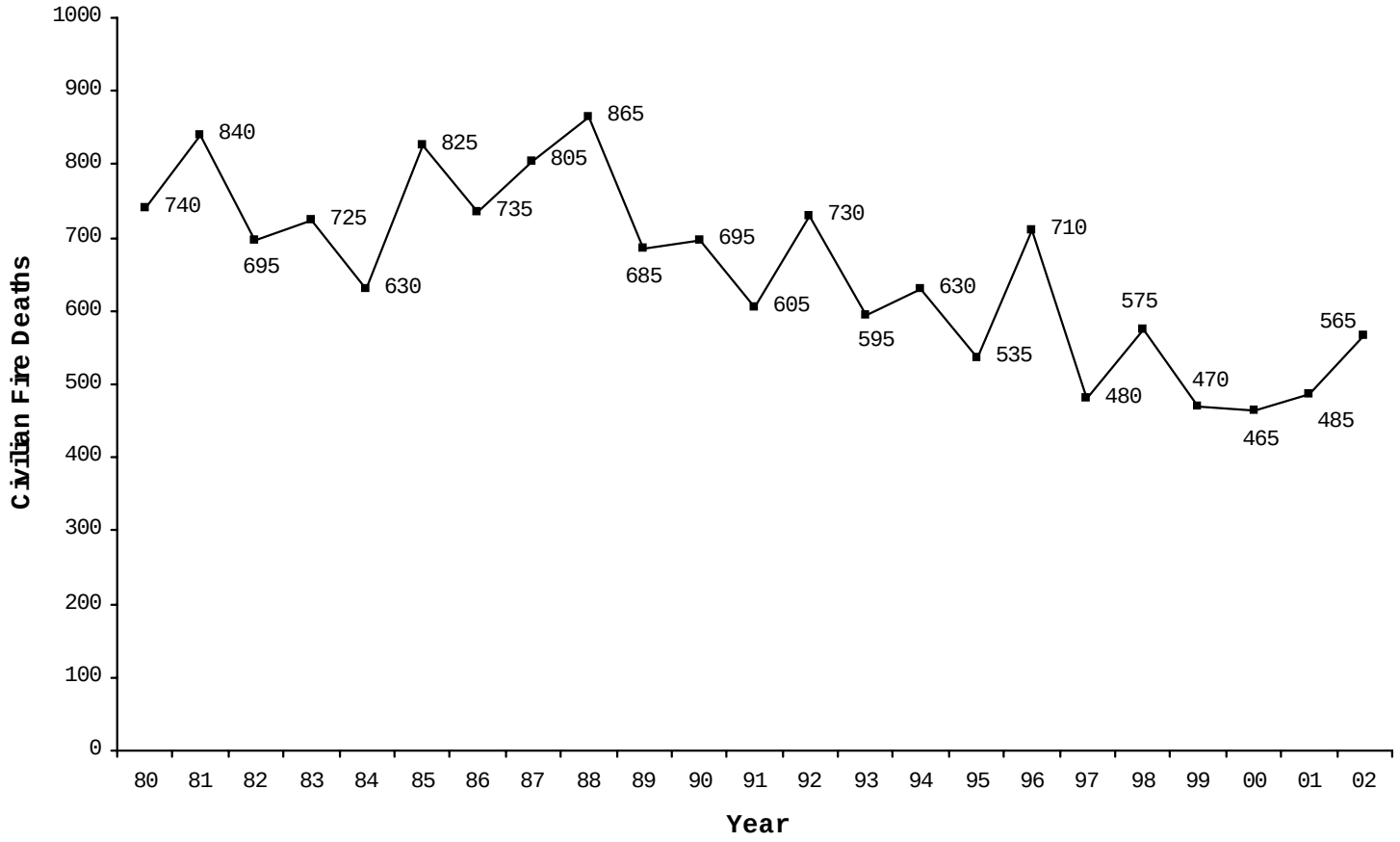
Source: NFPA survey, and "Purchasing Power of the Dollar" custom table from Bureau of Labor Statistics at http://www.bls.gov/cpi/.

Figure 1.
U.S. Vehicle Fire Trend, 1980-2002



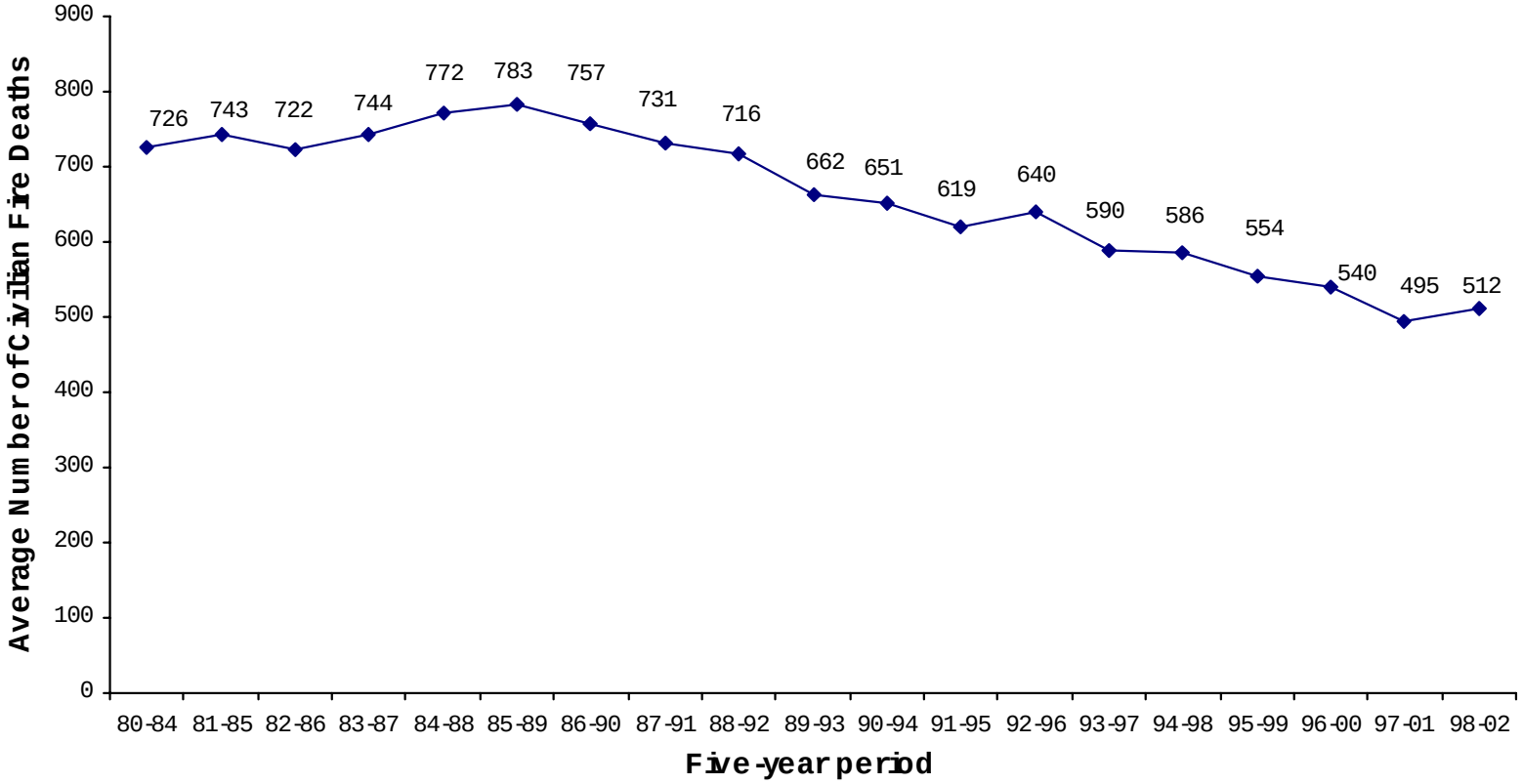
Source: *Fire Loss in the United States*, by Michael J. Karter, Jr.

Figure 2a.
U.S. Vehicle Fire Death Trend, 1980-2002



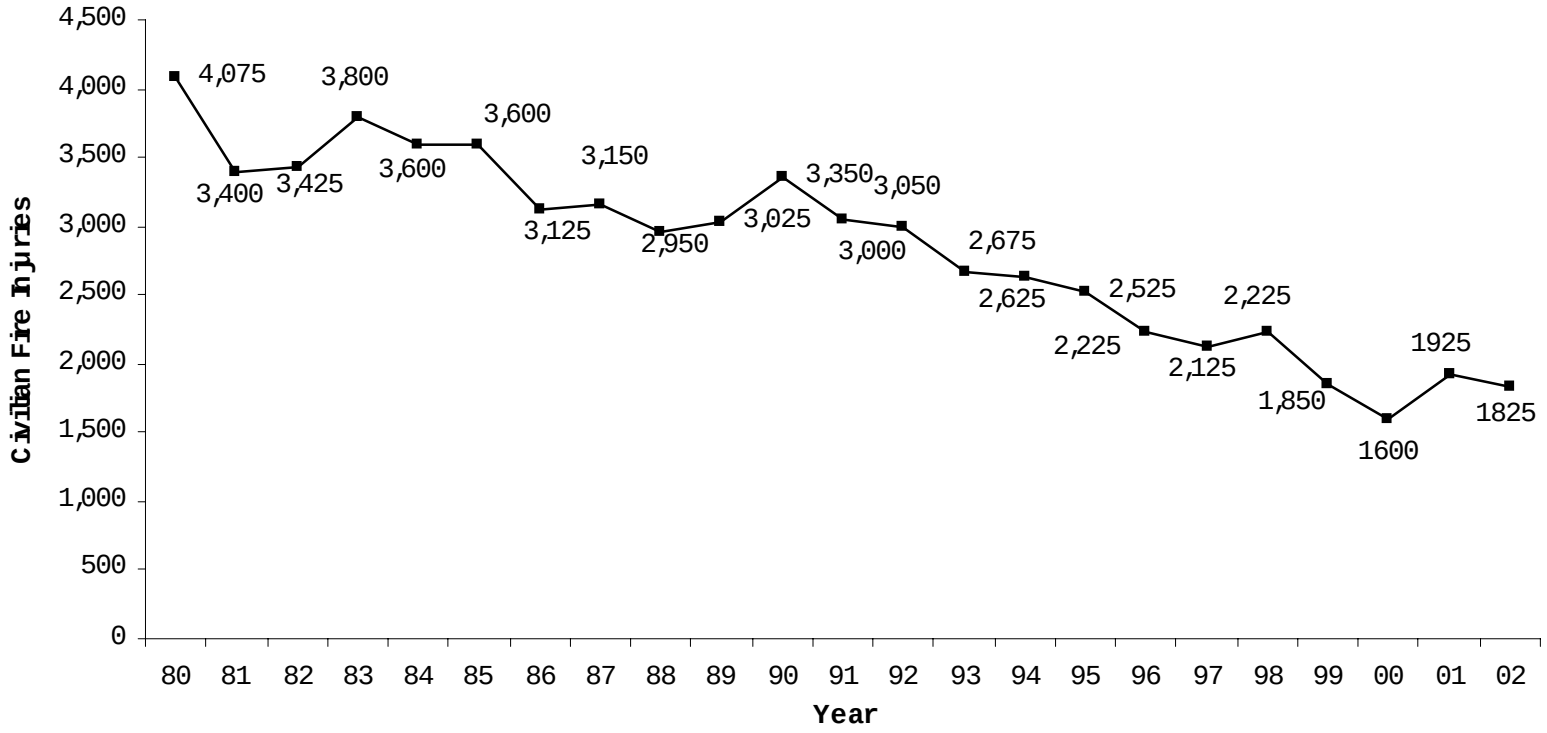
Source: *Fire Loss in the United States*, by Michael J. Karter, Jr.

Figure 2b.
U.S. Vehicle Fire Death Trend: Five-Year Rolling Averages



Source: *Fire Loss in the United States*, by Michael J. Karter, Jr.

Figure 3.
U.S. Vehicle Fire Injury Trend, 1980-2002



Source: *Fire Loss in the United States*, by Michael J. Karter, Jr.

Table 2A.
1999 U.S. Vehicle Fire Problem, by Type of Vehicle

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Highway vehicle	**288,220**	**(78.1%)**	**350**	**(74.6%)**	**1,154**	**(62.5%)**	**$904.1**	**(68.3%)**
Passenger or road transport vehicle	256,380	(69.5%)	248	(52.9%)	962	(52.1%)	$693.9	(52.4%)
Freight road vehicle	31,850	(8.6%)	102	(21.7%)	192	(10.4%)	$210.2	(15.9%)
Industrial, agricultural, construction or special vehicle	**9,300**	**(2.5%)**	**15**	**(3.3%)**	**69**	**(3.7%)**	**$105.6**	**(8.0%)**
Industrial, agricultural or construction vehicle	7,680	(2.1%)	12	(2.5%)	47	(2.6%)	$100.6	(7.6%)
Miscellaneous or special mobile property	1,620	(0.4%)	3	(0.7%)	21	(1.2%)	$5.0	(0.4%)
Water transport vehicle	**1,250**	**(0.3%)**	**2**	**(0.4%)**	**71**	**(3.9%)**	**$20.8**	**(1.6%)**
Rail transport vehicle	**600**	**(0.2%)**	**22**	**(4.7%)**	**294**	**(15.9%)**	**$32.1**	**(2.4%)**
Air transport vehicle	**170**	**(0.0%)**	**15**	**(3.3%)**	**0**	**(0.0%)**	**$3.3**	**(0.2%)**
Unclassified or unknown-type mobile property	**69,540**	**(18.8%)**	**65**	**(13.8%)**	**258**	**(14.0%)**	**$257.2**	**(19.4%)**
Total	**369,090**	**(100.0%)**	**469**	**(100.0%)**	**1,846**	**(100.0%)**	**$1,323.2**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 2B.
U.S. Vehicle Fire Problem, by Type of Vehicle
1994-1998 Annual Averages

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Highway vehicle	**332,280**	**(83.1%)**	**434**	**(74.0%)**	**1,747**	**(74.5%)**	**$875.6**	**(70.6%)**
Passenger road vehicle	295,170	(73.8%)	330	(56.3%)	1,403	(59.8%)	$692.6	(55.8%)
Freight road transport vehicle	37,100	(9.3%)	104	(17.7%)	345	(14.7%)	$183.0	(14.7%)
Industrial, agricultural, construction or special vehicle	**8,450**	**(2.1%)**	**9**	**(1.5%)**	**94**	**(4.0%)**	**$86.5**	**(7.0%)**
Industrial, agricultural or construction vehicle	6,260	(1.6%)	7	(1.2%)	65	(2.7%)	$77.2	(6.2%)
Special vehicle	2,200	(0.5%)	2	(0.4%)	29	(1.3%)	$9.3	(0.7%)
Water transport vehicle	**1,540**	**(0.4%)**	**6**	**(1.0%)**	**73**	**(3.1%)**	**$20.9**	**(1.7%)**
Rail transport vehicle	**650**	**(0.2%)**	**6**	**(1.0%)**	**12**	**(0.5%)**	**$21.0**	**(1.7%)**
Air transport vehicle	**200**	**(0.1%)**	**38**	**(6.5%)**	**25**	**(1.1%)**	**$39.7**	**(3.2%)**
Unclassified or unknown-type vehicle	**56,810**	**(14.2%)**	**94**	**(16.0%)**	**395**	**(16.8%)**	**$197.2**	**(15.9%)**
Total	**399,940**	**(100.0%)**	**586**	**(100.0%)**	**2,346**	**(100.0%)**	**$1,240.7**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

The U.S. Highway Vehicle Fire Problem

An estimated 288,220 highway vehicle fires were reported in 1999.
Highway vehicles include any vehicle that is customarily used on a highway, including cars, trucks, buses, motorcycles and recreational vehicles. A highway vehicle fire does not necessarily occur on a highway. In 1999, an estimated 288,220 highway vehicle fires were reported to U.S. fire departments. These fires caused an estimated 350 civilian deaths, 1,154 civilian fire injuries and $904,100,000 in direct property damage.

An average of 332,280 highway vehicle fires were reported per year during the five-year period of 1994 through 1998. These fires caused an annual average of 434 civilian fire deaths, 1,748 civilian fire injuries, and $875,600,000 in direct property damage.

Highway vehicle fires fell 8% from 1998 to 1999.
Highway vehicle fires fell 8% from 313,590 in 1998 to a record low of 288,220 in 1999. Civilian deaths from these fires fell 17% from 424 in 1998 to a record low of 350 in 1999. These deaths have fluctuated markedly. Civilian injuries in passenger road vehicle fires fell 28% from 1,608 in 1998 to a record low of 1,154 in 1999. Direct property damage, unadjusted for inflation, fell 10% from $1,009,800,000 in 1998 to $904,100,000 in 1999. The drop in dollar loss adjusted for inflation was 13%. No clear long-term trend can be seen in adjusted property damage. Since 1980, these fires have dropped just 30%. (See Table 3.) Structure fires fell 51% during the same period.

Roughly four out of five vehicle fires were in highway vehicles.
In 1999, highway vehicles accounted for 78% of the 369,090 reported vehicle fires, 75% of the 469 vehicle fire deaths, 63% of the 1,846 civilian injuries, and 68% of the $1,323,200,000 in direct property damage.

During 1994-1998, highway vehicle fires accounted for 83% of the 399,940 vehicle fires, 74% of the 586 vehicle fire deaths, 75% of the 2,346 civilian injuries, and 71% of the $1,240,700 in direct property damage. (See Table 2.) Table 4 shows that passenger vehicles were involved in 89% of the highway vehicle fires and freight vehicles were involved in 11% of the incidents. Automobiles accounted for 82-84% of the highway vehicle fires and pickups or other small trucks accounted for 6-7% of these fires.

Highway vehicle fires tend to be more common in the summer.
Tables 5, 6 and 7 show the patterns of highway vehicle fires by month, day and time. The peak month for these fires in both 1999 and in the 1994-1998 time period was July. In 1994-1998, August ranked second, June ranked third, and January was fourth. In 1999, January ranked second, August ranked third and June was fourth.

Friday was the peak day of the week for these fires.
If every day had an equal share of fires, each day would have 14.3% of the total, and most weekdays come close to this. Friday, however, was the peak day for highway vehicle fires, followed by Saturday. The fewest fires occur on Sunday. This pattern was seen in both 1999 and 1994-1998. (See Table 6.)

Vehicle fire times seem correlated with times vehicles are in use.
Vehicle fire times appear to be correlated with the times vehicles are in use. The smallest percentage of fires occurred between 3:00 and 6:00 a.m., and the percentage increased steadily as the day moved on, peaking between 3:00 and 6:00 p.m. (perhaps related to rush hour traffic). From that point, fires steadily decreased to the 3:00 to 6:00 a.m. period. (See Table 7.) This pattern is almost identical to the time of day pattern for home structure fires, except that the peak time for fires in homes was during the 6:00 to 7:00 p.m. period, when the returning household members may turn up the heat and cook the evening meal.[5]

In 1999, the largest share of deaths from highway vehicle fires resulted from incidents between 9:00 p.m. and midnight. The period from midnight to 3:00 a.m. ranked second. In 1994-1998, the top two periods were reversed.

Intentional vehicle fires tended to occur in darkness.
The pattern for intentional highway vehicle fires differs markedly from that seen for fires of other causes. Half of the intentional highway vehicle fires occurred between 9:00 p.m. and 3:00 a.m. Only 17% of the fires from other causes occurred during this period. Table 8 and Figure 4 show these differences. (Because NFIRS 5.0 system has broken the ignition factor field into three separate fields, the tables and figures on intentional fires and collisions by time of day were not reproduced with 1999 data.)

Fires caused by collisions peaked in the earliest morning hours.
A third pattern emerges for highway vehicle fires caused by collisions. These fires were fairly stable through the later afternoon and evening. However, they peaked in the hours just after midnight, dropping sharply after 3:00 a.m. One-quarter of the highway fire deaths that resulted from collisions were caused by fires that occurred during this period. It is possible that alcohol and/or fatigue were factors in the collisions that caused fires during these early morning hours. Figure 5 and Table 9 show this pattern.

Most highway vehicle fires occurred on road properties.
Table 10 shows that most of the highway vehicle fires occurred on some type of road property. In 1999, 43% occurred on residential streets or driveways, 15% were in parking lots or parking areas, and 10% occurred on highways. In 1994-1998, 38% occurred on paved public streets, 16% began in uncovered parking areas or parking lots, and 9% began on limited access or divided highways.

3 of every 5 passenger road vehicle fire deaths occurred in fires caused by collisions or overturns.
The causes of highway vehicle fires are shown in Tables 11 and 12. Collisions or overturns caused only 2% of the fires in this group, but these fires caused 61-65% of the fire deaths. Roughly one of every 23-27 highway vehicle *fires* caused by a collision or overturn resulted in death. This is *not* the same as saying that roughly one of every 23-27 highway vehicle *collisions* resulted in death. Nevertheless, it is very clear that highway vehicle fires caused by collision or overturn have a high fatality rate.

[5] Marty Ahrens, *The U.S. Fire Problem Overview Report*, Quincy, MA: NFPA, Fire Analysis and Research Division, June 2003, p. 99.

Mechanical or electrical failures caused 2/3 of these vehicle fires.
In 1994-1998, roughly two-thirds (66%) of the highway vehicle fires were caused by some form of mechanical or electrical failure, such as part failures, short circuits or backfires. Part failures, leaks or breaks caused one-fifth (19%) of the passenger road vehicle fires. Short circuits or ground faults caused 18% of the fires in these vehicles, 10% were caused by backfires and 7% resulted from other electrical failures. In 1999, 67% were caused by the failure of equipment or heat source. The conversion process used with 1999 data makes double counting of electrical factors contributing to ignition common.

Intentional fires caused disproportionate dollar loss.
One in six of the highway vehicle fires was intentionally set. These fires represented 16-17% of the fires in this group, but accounted for 23-25% of the dollar loss.

Fires started in engine, running gear or wheel area most often, but fuel tank or fuel line fires posed highest death risk given fire.
Table 13 shows that 67% of the fires began in the engine, running gear or wheel area. Thirty-seven to forty-three percent of the deaths, 48-52% of the injuries and 56% of the direct property damage resulted from fires that originated in this area. Only 1-2% of the passenger road vehicle fires started in the fuel tank or fuel line area, but these fires caused 19-21% of the deaths in this group.

Gasoline was the type of material most frequently first ignited.
The items or forms and types of material first ignited in highway vehicle fires are shown in Tables 14 and 15. Changes in the coding structure and/or code definitions may have contributed to a change in the relative ranking of the item or form of material first ignited. In 1999, electrical wire or cable insulation was the most common item first ignited, followed by flammable or combustible liquid or gas in or from its final container. In 1994-1998, the leading form of material first ignited was fuel, followed by electrical wire or cable insulation. Gasoline was the type of material first ignited in 35% of the highway vehicle fires and more than half of the associated civilian deaths in 1994-1998. Due to rule changes introduced with NFIRS 5.0, a direct comparison is not possible. Consequently, a 1999 table for type of material first ignited was not provided.

79% of U.K. car fires were "malicious."
Highway vehicle fires have a different profile in the United Kingdom. In 2001, 102,100 road vehicles resulted in 68 fatalities and 689 injuries. The 102,100 vehicle fire total was the highest seen in the decade. Eighty-eight percent of these vehicles were cars. Seventy-nine percent (70,100) of the car fires were "malicious." The number of malicious car fires has been climbing since 1998, increasing 32% from 1998 to 1999, 12% from 1999 to 2000, and 11% from 2000 to 2001. Non-malicious car fires fell 5% from 2000 to 2001. As in the U.S., malicious car fires were more common at night or the early hours of the morning, while other car fires were more spread out and peaked in the late afternoon and early evening.[6]

[6] Lorraine Watson, Georigna Ford, Darren Sugg, and John Gamble, *Fire Statistics --United Kingdom, 2001*, London, U.K, Office of the Deputy Prime Minister, Fire Statistics and Research, April 29, 2003, pp. 50-51, available from http://www.odpm.gov.uk/stellent/groups/odpm_fire/documents/downloadable/odpm_fire_022869.pdf.

In 1999, the 13,020 ground transport vehicle fires in Canada caused 28 civilian deaths and 94 civilian injuries.[7]

Federal and state programs affect different pieces of vehicle fire problem.
As with other fire problems, efforts to address the vehicle fire problem have included technology, standards and regulations, education and enforcement. Two examples follow:

> **The National Highway Traffic Safety Administration regulates highway vehicles and orders recalls.**
> Passenger road vehicles are regulated by The National Highway Traffic Safety Administration (NHTSA) of the Department of Transportation (DOT). The DOT sets minimum safety standards for new motor vehicles and motor vehicle equipment and investigates reports of defects in motor vehicles, including fire hazards. Recalls are ordered when necessary. Information about safety problems, issues and recalls can be found at http://www.nhtsa.dot.gov/cars/problems/.
>
> The NHTSA has issued four fire safety-standards for new motor vehicles since it was created in 1966. The Federal Motor Vehicle Safety Standard (FMVSS) 301 was developed to reduce the danger from fuel leakage following crashes involving cars, trucks and buses weighing less than 10,000 pounds. Initially affecting cars manufactured on or after January 1, 1968, this standard has been made increasingly stringent.
>
> Flammability standards for the materials used in the driver and passenger area of vehicles were set in Federal Motor Vehicle Safety Standard 302 to reduce the danger of interior fires caused by matches or smoking. The other two standards address vehicles using compressed natural gas.[8]

From the high rate of death in vehicle fires that follow collisions and the frequency in which gasoline is the material first ignited in vehicle fire deaths, it appears that post-crash release of fuel remains a problem.

> **Burned/Recovered Motor Vehicle Act reduced vehicle arson 79% in Massachusetts.**
> As mentioned earlier, intentional motor vehicle fires cause a disproportionate share of the vehicle fire dollar loss. The Commonwealth of Massachusetts passed legislation to address the problem of vehicle arson motivated by insurance fraud. Effective August 1987, the Burned/Recovered Motor Vehicle Act required owners of burned motor vehicles to personally appear and complete a report at fire headquarters in the community where the fire occurred before the insurance company could pay their claim for fire damages. Vehicle arson dropped 85% from 1987 to 2001 in Massachusetts.[9]

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[7] Council of Canadian Fire Marshals and Fire Commissioners, *Annual Report 1999 - Fire Losses in Canada,* June 2002, p. 18.
[8] Larry Strawhorn, "Motor Vehicles," *Fire Protection Handbook,* 19th edition, Section 14, Chapter 1, p.14-5, Quincy, MA: NFPA, 2003.
[9] *Massachusetts Fire Incident Reporting System - 2001 Annual Report*: Stow, Massachusetts, 2003, p. 105.

Table 3.
U.S. Highway Vehicle Fire Problem, by Year: 1980-1999

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)	Loss in 1999 Dollars
1980	411,280	599	3,349	$477.8	$967.6
1981	417,460	679	2,930	$476.9	$872.6
1982	398,380	565	2,849	$408.6	$704.8
1983	405,410	644	3,246	$531.7	$888.9
1984	411,590	553	3,078	$592.4	$948.9
1985	416,960	712	3,057	$702.1	$1,085.9
1986	417,650	741	3,179	$607.9	$925.1
1987	429,270	695	2,624	$687.3	$1,008.1
1988	415,980	733	2,518	$728.3	$1,026.9
1989	379,080	524	2,571	$751.1	$1,010.2
1990	383,010	586	2,915	$792.4	$1,011.7
1991	371,170	481	2,502	$801.3	$980.3
1992	335,740	592	2,509	$757.6	$900.3
1993	354,650	497	2,376	$723.5	$834.4
1994	330,140	461	1,960	$778.8	$876.2
1995	334,710	380	1,783	$790.0	$863.7
1996	327,840	474	1,523	$774.0	$823.0
1997	355,110	430	1,864	$1,025.2	$1,064.5
1998	313,590	424	1,608	$1,009.8	$1,033.4
1980-1998 Annual average	379,420	567	2,550	$706.2	$938.2
1994-1998 Annual average	332,280	434	1,748	$875.6	$932.2
1999*	288,220	350	1,154	$904.1	$904.1

* NFIRS data for 1999 was received in the Version 5.0 format and involves enough coding changes that it can better be analyzed separately from data from previous years.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires were rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars.

Source: NFIRS and NFPA survey, "Purchasing Power of the Dollar" custom table from Bureau of Labor Statistics at http://www.bls.gov/cpi/.

Table 4A.
1999 U.S. Highway Vehicle Fire Problem, by Type of Vehicle

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Passenger or road transport vehicles	**256,380**	**(89.0%)**	**248**	**(70.9%)**	**962**	**(83.4%)**	**$693.9**	**(76.8%)**
Passenger car	236,240	(82.0%)	230	(65.5%)	749	(64.9%)	$582.0	(64.4%)
Motorcycle or trail bike	2,150	(0.7%)	3	(1.0%)	17	(1.4%)	$37.7	(4.2%)
Motor home, camper or bookmobile.	2,120	(0.7%)	0	(0.0%)	76	(6.6%)	$17.3	(1.9%)
Bus, school bus or trackless trolley	1,900	(0.7%)	3	(1.0%)	40	(3.5%)	$16.4	(1.8%)
Travel trailer, designed to be towed	850	(0.3%)	0	(0.0%)	12	(1.0%)	$3.4	(0.4%)
Camping or collapsible trailer	350	(0.1%)	0	(0.0%)	17	(1.4%)	$0.8	(0.1%)
Manufactured home	280	(0.1%)	2	(0.5%)	9	(0.8%)	$1.5	(0.2%)
Off-road recreational vehicle	150	(0.1%)	0	(0.0%)	0	(0.0%)	$0.7	(0.1%)
Unclassified or unknown-type passenger road vehicle	12,340	(4.3%)	10	(2.9%)	43	(3.7%)	$34.0	(3.8%)
Freight road vehicles	**31,850**	**(11.0%)**	**102**	**(29.1%)**	**192**	**(16.6%)**	**$210.2**	**(23.2%)**
Pickup truck or non-motorized hauling rig	16,520	(5.7%)	41	(11.7%)	90	(7.8%)	$48.2	(5.3%)
General use truck, dump truck or fire apparatus	7,830	(2.7%)	7	(1.9%)	26	(2.3%)	$38.8	(4.3%)
Semi-trailer designed for freight	4,340	(1.5%)	37	(10.7%)	40	(3.5%)	$79.2	(8.8%)
Garbage, waste or refuse truck	1,030	(0.4%)	0	(0.0%)	7	(0.6%)	$8.1	(0.9%)
Tank truck for flammable or combustible liquid	260	(0.1%)	15	(4.4%)	14	(1.2%)	$20.9	(2.3%)
Tank truck for nonflammable cargo	110	(0.0%)	0	(0.0%)	2	(0.2%)	$1.8	(0.2%)
Tank truck for compressed gas or LP-gas	20	(0.0%)	0	(0.0%)	0	(0.0%)	$0.1	(0.0%)
Unclassified or unknown-type freight road vehicle	1,730	(0.6%)	2	(0.5%)	12	(1.0%)	$13.0	(1.4%)
Total	**288,220**	**(100.0%)**	**350**	**(100.0%)**	**1,154**	**(100.0%)**	**$904.1**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.
Source: NFIRS and NFPA survey.

Table 4B.
U.S. Highway Vehicle Fire Problem, by Type of Vehicle
1994-1998 Annual Averages

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Passenger road vehicle	**295,170**	**(88.8%)**	**330**	**(76.1%)**	**1,403**	**(80.3%)**	**$692.6**	**(79.1%)**
Automobile	280,550	(84.4%)	302	(69.7%)	1,161	(66.4%)	$609.8	(69.6%)
Motor home	2,330	(0.7%)	7	(1.6%)	78	(4.4%)	$22.2	(2.5%)
All terrain vehicle	2,250	(0.7%)	4	(0.9%)	26	(1.5%)	$20.6	(2.4%)
Bus or trackless trolley	1,990	(0.6%)	1	(0.2%)	50	(2.9%)	$16.5	(1.9%)
Travel trailer	920	(0.3%)	3	(0.7%)	26	(1.5%)	$4.3	(0.5%)
Mobile building or manufactured housing	340	(0.1%)	1	(0.3%)	5	(0.3%)	$2.6	(0.3%)
Camping trailer	300	(0.1%)	1	(0.2%)	4	(0.2%)	$0.6	(0.1%)
Unclassified or unknown-type passenger road vehicle	6,500	(2.0%)	10	(2.4%)	53	(3.0%)	$15.9	(1.8%)
Freight road vehicle	**37,100**	**(11.2%)**	**104**	**(23.9%)**	**345**	**(19.7%)**	**$183.0**	**(20.9%)**
General use truck under one ton	22,090	(6.6%)	49	(11.3%)	181	(10.4%)	$59.3	(6.8%)
General use truck over one ton	7,540	(2.3%)	10	(2.4%)	60	(3.5%)	$35.5	(4.1%)
Semi-trailer truck with or without a trailer	4,370	(1.3%)	32	(7.4%)	53	(3.1%)	$56.6	(6.5%)
Trash truck	1,130	(0.3%)	1	(0.3%)	12	(0.7%)	$6.0	(0.7%)
Tank truck for flam or combustible liquid or chemical	290	(0.1%)	7	(1.5%)	19	(1.1%)	$6.3	(0.7%)
Tank truck for nonflammable cargo	150	(0.0%)	0	(0.0%)	1	(0.1%)	$1.2	(0.1%)
Tank truck for compressed gas or LP-gas	50	(0.0%)	1	(0.2%)	6	(0.3%)	$2.2	(0.3%)
Unclassified or unknown-type freight road vehicle	1,480	(0.4%)	3	(0.8%)	12	(0.7%)	$15.9	(1.8%)
Total	**332,280**	**(100.0%)**	**434**	**(100.0%)**	**1,748**	**(100.0%)**	**$875.6**	**(100.0)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 5A.
1999 U.S. Highway Vehicle Fires, by Month

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	27,510	(9.5%)	37	(10.7%)	88	(7.6%)	$91.5	(10.1%)
February	20,660	(7.2%)	32	(9.2%)	73	(6.4%)	$61.1	(6.8%)
March	22,580	(7.8%)	22	(6.3%)	85	(7.4%)	$69.3	(7.7%)
April	22,820	(7.9%)	14	(3.9%)	69	(6.0%)	$73.6	(8.1%)
May	25,270	(8.8%)	31	(8.7%)	121	(10.5%)	$88.1	(9.7%)
June	26,160	(9.1%)	29	(8.3%)	111	(9.7%)	$73.1	(8.1%)
July	28,350	(9.8%)	32	(9.2%)	116	(10.1%)	$85.4	(9.4%)
August	26,520	(9.2%)	36	(10.2%)	114	(9.9%)	$84.2	(9.3%)
September	23,920	(8.3%)	31	(8.7%)	92	(8.0%)	$74.7	(8.3%)
October	23,140	(8.0%)	31	(8.7%)	114	(9.9%)	$73.0	(8.1%)
November	21,460	(7.4%)	36	(10.2%)	97	(8.4%)	$69.4	(7.7%)
December	19,840	(6.9%)	20	(5.8%)	73	(6.4%)	$60.8	(6.7%)
Total	288,220	(100.0%)	350	(100.0%)	1,154	(100.0%)	$904.1	(100.0%)
Monthly average	24,020	(8.3%)	29	(8.3%)	96	(8.3%)	$75.3	(8.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 5B.
U.S. Highway Vehicle Fires, by Month
1994-1998 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	29,010	(8.7%)	28	(6.5%)	141	(8.1%)	$76.1	(8.7%)
February	26,110	(7.9%)	28	(6.5%)	123	(7.0%)	$66.1	(7.5%)
March	27,990	(8.4%)	41	(9.3%)	161	(9.2%)	$75.8	(8.7%)
April	26,590	(8.0%)	30	(6.9%)	147	(8.4%)	$67.6	(7.7%)
May	28,410	(8.6%)	38	(8.8%)	146	(8.4%)	$72.1	(8.2%)
June	29,560	(8.9%)	33	(7.5%)	167	(9.5%)	$82.0	(9.4%)
July	31,280	(9.4%)	45	(10.4%)	163	(9.3%)	$83.6	(9.6%)
August	29,830	(9.0%)	33	(7.5%)	156	(8.9%)	$81.6	(9.3%)
September	26,630	(8.0%)	40	(9.1%)	149	(8.5%)	$69.5	(7.9%)
October	27,060	(8.1%)	42	(9.7%)	142	(8.1%)	$71.8	(8.2%)
November	24,810	(7.5%)	45	(10.3%)	134	(7.7%)	$63.1	(7.2%)
December	24,990	(7.5%)	32	(7.4%)	120	(6.8%)	$66.2	(7.6%)
Total	332,280	(100.0%)	435	(100.0%)	1,749	(100.0%)	$875.6	(100.0%)
Monthly average	27,690	(8.3%)	36	(8.3%)	146	(8.3%)	$73.0	(8.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 6A.
1999 U.S. Highway Vehicle Fires, by Day of Week

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	37,790	(13.1%)	56	(16.0%)	128	(11.1%)	$130.0	(14.4%)
Monday	41,630	(14.4%)	36	(10.2%)	232	(20.1%)	$121.3	(13.4%)
Tuesday	41,080	(14.3%)	48	(13.6%)	168	(14.6%)	$123.9	(13.7%)
Wednesday	40,040	(13.9%)	48	(13.6%)	154	(13.3%)	$120.3	(13.3%)
Thursday	40,160	(13.9%)	39	(11.2%)	156	(13.6%)	$117.5	(13.0%)
Friday	44,620	(15.5%)	65	(18.4%)	145	(12.5%)	$147.4	(16.3%)
Saturday	42,900	(14.9%)	60	(17.0%)	171	(14.8%)	$143.6	(15.9%)
Total	288,220	(100.0%)	350	(100.0%)	1,154	(100.0%)	$904.1	(100.0%)
Daily average	41,170	(14.3%)	50	(14.3%)	165	(14.3%)	$129.2	(14.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the day of week was unknown or not reported have been allocated proportionally among fires with known day of week.

Source: NFIRS and NFPA survey.

Table 6B.
U.S. Highway Vehicle Fires, by Day of Week
1994-1998 Annual Averages

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	43,530	(13.1%)	74	(17.0%)	226	(12.9%)	$123.2	(14.1%)
Monday	48,700	(14.7%)	56	(12.9%)	248	(14.2%)	$127.9	(14.6%)
Tuesday	46,920	(14.1%)	62	(14.3%)	226	(12.9%)	$125.7	(14.4%)
Wednesday	46,480	(14.0%)	42	(9.7%)	250	(14.3%)	$121.6	(13.9%)
Thursday	46,900	(14.1%)	55	(12.6%)	237	(13.5%)	$122.9	(14.0%)
Friday	50,700	(15.3%)	60	(13.7%)	291	(16.7%)	$127.7	(14.6%)
Saturday	49,040	(14.8%)	86	(19.8%)	270	(15.4%)	$126.5	(14.5%)
Total	332,280	(100.0%)	434	(100.0%)	1,747	(100.0%)	$875.6	(100.0%)
Daily average	47,470	(14.3%)	62	(14.3%)	250	(14.3%)	$125.1	(14.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the day of week was unknown or not reported have been allocated proportionally among fires with known day of week.

Source: NFIRS and NFPA survey.

Table 7A.
1999 U.S. Highway Vehicle Fires, by Time of Day

Time of Day		Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
12:01 - 3:00 a.m.	27,320	(9.5%)	58	(16.5%)	126	(10.9%)	$110.8	(12.3%)
3:01 - 6:00 a.m.	19,250	(6.7%)	61	(17.5%)	88	(7.6%)	$98.5	(10.9%)
6:01 - 9:00 a.m.	27,020	(9.4%)	27	(7.8%)	71	(6.2%)	$80.7	(8.9%)
9:01 - Noon	32,870	(11.4%)	36	(10.2%)	159	(13.8%)	$98.3	(10.9%)
12:01 - 3:00 p.m.	45,870	(15.9%)	19	(5.3%)	235	(20.3%)	$124.0	(13.7%)
3:01 - 6:00 p.m.	54,540	(18.9%)	44	(12.6%)	211	(18.3%)	$137.7	(15.2%)
6:01 - 9:00 p.m.	45,020	(15.6%)	46	(13.1%)	159	(13.8%)	$121.8	(13.5%)
9:01 - Midnight	36,340	(12.6%)	60	(17.0%)	107	(9.2%)	$132.4	(14.6%)
Total	288,220	(100.0%)	350	(100.0%)	1,154	(100.0%)	$904.1	(100.0%)
Average	36,030	(12.5%)	44	(12.5%)	144	(12.5%)	$113.0	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 7B.
U.S. Highway Vehicle Fires, by Time of Day
1994-1998 Annual Averages

Time of Day		Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
12:01 - 3:00 a.m.	29,850	(9.0%)	94	(21.7%)	136	(7.8%)	$111.1	(12.7%)
3:01 - 6:00 a.m.	20,920	(6.3%)	60	(13.9%)	98	(5.6%)	$84.8	(9.7%)
6:01 - 9:00 a.m.	31,120	(9.4%)	42	(9.7%)	145	(8.3%)	$79.4	(9.1%)
9:01 - Noon	39,040	(11.8%)	43	(9.9%)	222	(12.7%)	$91.7	(10.5%)
12:01 - 3:00 p.m.	52,140	(15.7%)	45	(10.3%)	309	(17.7%)	$120.7	(13.8%)
3:01 - 6:00 p.m.	62,450	(18.8%)	43	(10.0%)	345	(19.7%)	$136.5	(15.6%)
6:01 - 9:00 p.m.	53,060	(16.0%)	49	(11.3%)	291	(16.6%)	$128.7	(14.7%)
9:01 - Midnight	43,700	(13.2%)	57	(13.2%)	202	(11.6%)	$122.5	(14.0%)
Total	332,280	(100.0%)	434	(100.0%)	1,748	(100.0%)	$875.6	(100.0%)
Average	41,530	(12.5%)	54	(12.5%)	218	(12.5%)	$109.4	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

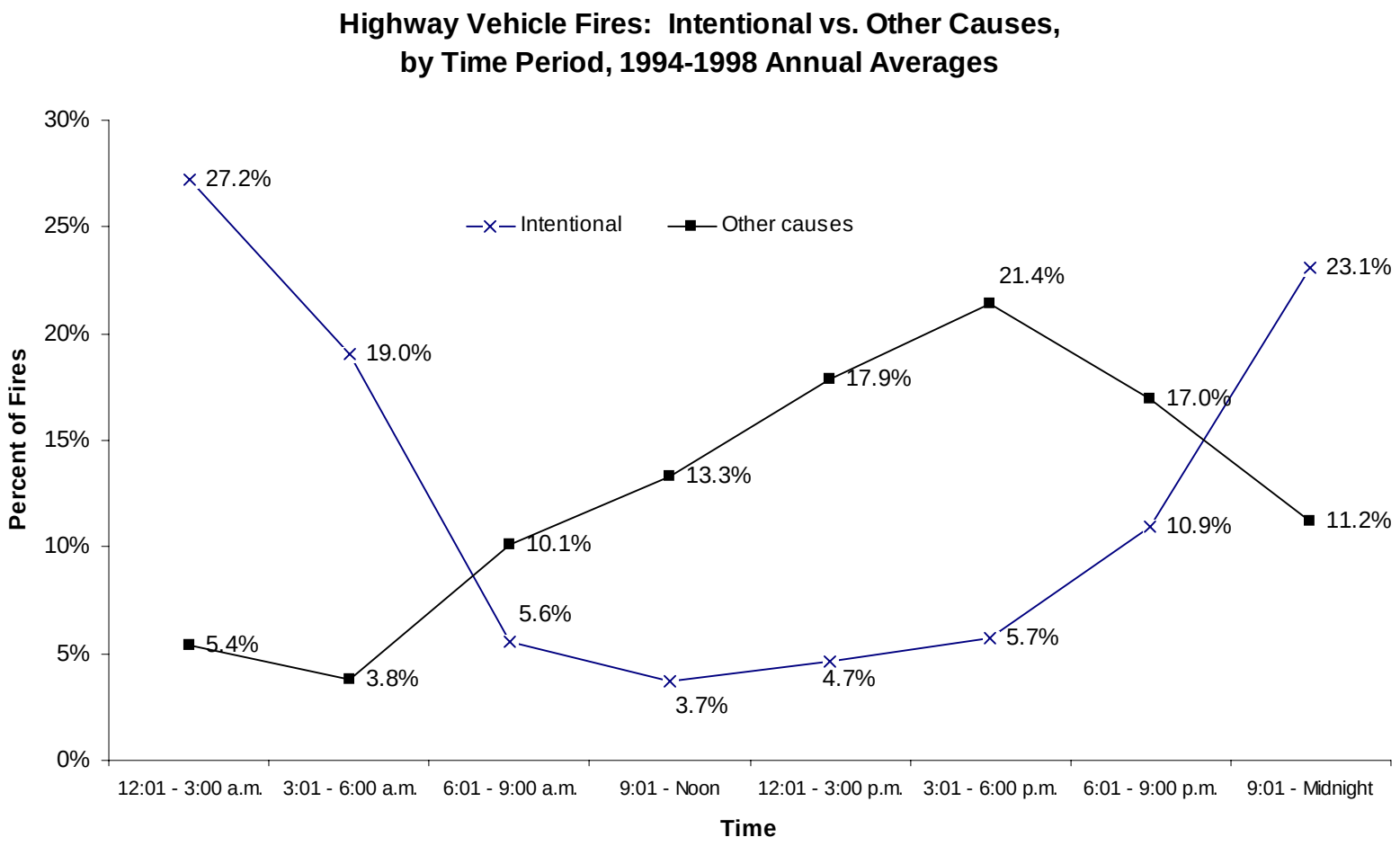
Table 8.
U.S. Highway Vehicle Fires, by Time of Day
Intentional vs. Other Causes
Fires and Direct Property Damage
1994-1998 Annual Averages

	Intentional				Other Causes			
Time of Day	**Fires**		**Direct Property Damage (in Millions)**		**Fires**		**Direct Property Damage (in Millions**	
12:01 - 3:00 a.m.	14,950	(27.2%)	$63.4	(29.2%)	14,900	(5.4%)	$47.8	(7.3%)
3:01 - 6:00 a.m.	10,460	(19.0%)	$43.5	(20.0%)	10,460	(3.8%)	$41.3	(6.3%)
6:01 - 9:00 a.m.	3,070	(5.6%)	$11.1	(5.1%)	28,050	(10.1%)	$68.3	(10.4%)
9:01 - Noon	2,050	(3.7%)	$6.5	(3.0%)	37,000	(13.3%)	$85.2	(12.9%)
12:01 - 3:00 p.m.	2,560	(4.7%)	$7.8	(3.6%)	49,580	(17.9%)	$112.9	(17.2%)
3:01 - 6:00 p.m.	3,140	(5.7%)	$10.2	(4.7%)	59,310	(21.4%)	$126.4	(19.2%)
6:01 - 9:00 p.m.	6,000	(10.9%)	$22.9	(10.6%)	47,060	(17.0%)	$105.8	(16.1%)
9:01 - Midnight	12,710	(23.1%)	$51.8	(23.9%)	30,990	(11.2%)	$70.6	(10.7%)
Total	54,940	(100.0%)	$217.2	(100.0%)	277,340	(100.0%)	$658.4	(100.0%)
Average	6,870	(12.5%)	$27.1	(12.5%)	34,670	(12.5%)	$82.3	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Figure 4.



Source: National estimates based on NFIRS and NFPA survey.

Table 9.
U.S Highway Vehicle Fires, by Time of Day
Collisions or Overturns vs. Other Causes
Fires and Civilian Deaths
1994-1998 Annual Averages

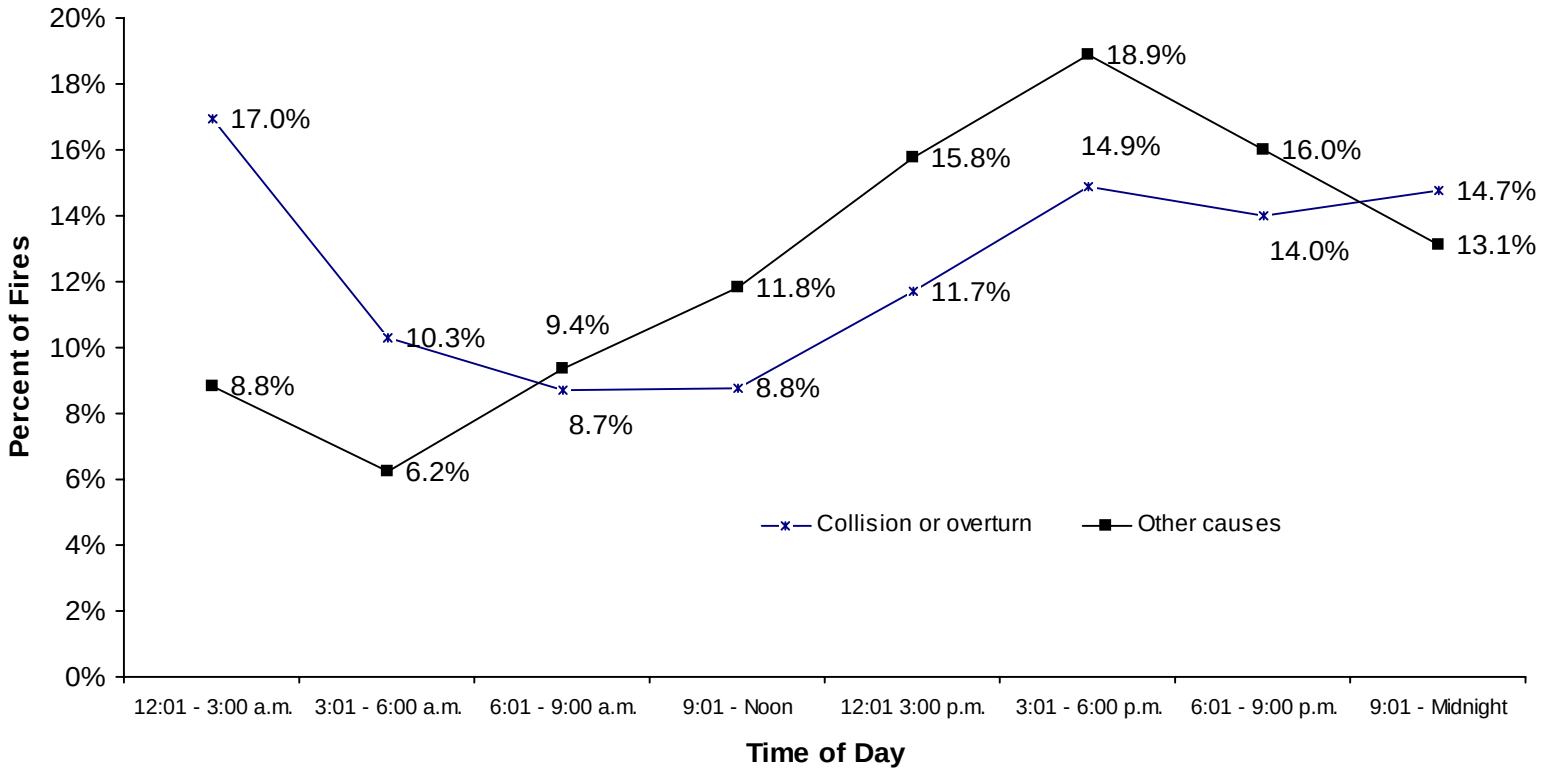
	Collision or Overturn				Other Causes			
Time of Day	**Fires**		**Civilian Deaths**		**Fires**		**Civilian Deaths**	
12:01 - 3:00 a.m.	1,050	(17.0%)	65	(24.9%)	28,810	(8.8%)	29	(16.8%)
3:01 - 6:00 a.m.	630	(10.3%)	31	(11.7%)	20,280	(6.2%)	29	(17.1%)
6:01 - 9:00 a.m.	540	(8.7%)	20	(7.5%)	30,590	(9.4%)	23	(13.1%)
9:01 - Noon	540	(8.8%)	28	(10.6%)	38,500	(11.8%)	15	(8.8%)
12:01 - 3:00 p.m.	720	(11.7%)	25	(9.5%)	51,420	(15.8%)	20	(11.6%)
3:01 - 6:00 p.m.	920	(14.9%)	25	(9.7%)	61,530	(18.9%)	18	(10.4%)
6:01 - 9:00 p.m.	860	(14.0%)	35	(13.3%)	52,190	(16.0%)	14	(8.3%)
9:01 – Midnight	910	(14.7%)	33	(12.8%)	42,790	(13.1%)	24	(14.0%)
Total	6,160	(100.0%)	262	(100.0%)	326,110	(100.0%)	172	(100.0%)
Average	770	(12.5%)	33	(12.5%)	40,760	(12.5%)	21	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires were rounded to the nearest ten and civilian deaths were rounded to the nearest one. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Sums may not equal totals due to rounding errors. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Figure 5.

Highway Vehicle Fires: Collisions vs. Other Causes, by Time of Day, 1994-1998 Annual Averages



Source: National estimates based on NFIRS and NFPA survey.

Table 10A.
1999 U.S. Highway Fires, by Fixed Property Use

Fixed Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Residential street, road or residential driveway	124,450	(43.2%)	165	(47.1%)	472	(40.9%)	$321.2	(35.5%)
Vehicle parking area	43,810	(15.2%)	7	(1.9%)	126	(10.9%)	$111.2	(12.3%)
Highway or divided highway	30,220	(10.5%)	85	(24.3%)	149	(12.9%)	$141.4	(15.6%)
Unclassified or unknown-type road or parking property	19,640	(6.8%)	12	(3.4%)	62	(5.3%)	$61.6	(6.8%)
One- or two-family dwelling	11,500	(4.0%)	7	(1.9%)	62	(5.3%)	$34.3	(3.8%)
Open land or field	4,900	(1.7%)	10	(2.9%)	28	(2.5%)	$20.6	(2.3%)
Service station or gas station	3,870	(1.3%)	0	(0.0%)	33	(2.9%)	$7.0	(0.8%)
Motor vehicle or boat sales, service or repair	2,740	(1.0%)	0	(0.0%)	12	(1.0%)	$11.9	(1.3%)
Other known property use	25,970	(9.0%)	32	(9.2%)	145	(12.5%)	$10.5	(10.1%)
Unclassified or unknown-type property use	21,130	(7.3%)	32	(9.2%)	66	(5.7%)	$104.0	(11.5%)
Total	288,220	(100.0%)	350	(100.0%)	1,154	(100.0%)	$904.1	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 10B.
U.S. Highway Vehicle Fires, by Fixed Property Use
1994-1998 Annual Averages

Fixed Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Paved public street	124,990	(37.6%)	148	(34.1%)	572	(32.7%)	$273.6	(31.3%)
Uncovered parking area	52,970	(15.9%)	19	(4.5%)	240	(13.7%)	$105.2	(12.0%)
Limited access or divided highway	32,010	(9.6%)	123	(28.4%)	234	(13.4%)	$106.9	(12.2%)
Unclassified or unknown-type road property	17,530	(5.3%)	24	(5.6%)	62	(3.5%)	$57.9	(6.6%)
Paved private street or way	15,050	(4.5%)	9	(2.1%)	86	(4.9%)	$35.2	(4.0%)
One- or two-family dwelling	13,070	(3.9%)	13	(3.0%)	109	(6.2%)	$31.1	(3.5%)
Unpaved street, road or path	9,600	(2.9%)	19	(4.4%)	54	(3.1%)	$32.2	(3.7%)
Open land or field	6,050	(1.8%)	13	(3.1%)	36	(2.1%)	$24.0	(2.7%)
Public service station	4,160	(1.3%)	1	(0.2%)	34	(2.0%)	$7.0	(0.8%)
Other known fixed property use	30,630	(9.2%)	36	(8.4%)	228	(13.1%)	$102.9	(11.8%)
Unclassified or unknown-type fixed property use	26,230	(7.9%)	27	(6.3%)	93	(5.3%)	$99.4	(11.4%)
Total	332,280	(100.0%)	434	(100.0%)	1,747	(100.0%)	$875.6	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 11A. 1999 U.S. Highway Vehicle Fires, by Factor Contributing to Ignition

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unspecified short-circuit arc*	59,020	(20.5%)	2	(0.6%)	89	(7.7%)	$141.9	(15.7%)
Leak or break	51,510	(17.9%)	19	(5.6%)	186	(16.1%)	$131.2	(14.5%)
Unclassified or unknown-type mechanical failure or malfunction	31,850	(11.0%)	6	(1.9%)	68	(5.9%)	$87.9	(9.7%)
Backfire	21,930	(7.6%)	2	(0.6%)	83	(7.2%)	$34.9	(3.9%)
Unclassified or unknown-type electrical failure or malfunction*	20,510	(7.1%)	0	(0.0%)	35	(3.1%)	$63.9	(7.1%)
Short circuit arc from defective or worn insulation*	14,780	(5.1%)	0	(0.0%)	21	(1.8%)	$32.1	(3.6%)
Unclassified factor contributed to ignition	8,810	(3.1%)	24	(6.8%)	41	(3.6%)	$29.9	(3.3%)
Exposure to other fire	8,580	(3.0%)	4	(1.2%)	9	(0.8%)	$31.4	(3.5%)
Short circuit arc from mechanical damage*	8,490	(2.9%)	2	(0.6%)	32	(2.8%)	$19.2	(2.1%)
Worn out	7,150	(2.5%)	0	(0.0%)	6	(0.5%)	$11.0	(1.2%)
Collision, knock down, run over or overturn	5,860	(2.0%)	229	(65.4%)	233	(20.2%)	$68.6	(7.6%)
Flammable liquid or gas spilled	5,160	(1.8%)	17	(4.9%)	86	(7.4%)	$23.5	(2.6%)
Heat source too close to combustibles	4,950	(1.7%)	0	(0.0%)	21	(1.8%)	$9.8	(1.1%)
Abandoned or discarded materials or products	4,560	(1.6%)	0	(0.0%)	38	(3.3%)	$9.0	(1.0%)
Overloaded equipment*	4,280	(1.5%)	0	(0.0%)	15	(1.3%)	$11.6	(1.3%)
Unclassified operational deficiency	3,540	(1.2%)	0	(0.0%)	3	(0.3%)	$8.6	(0.9%)
No contributing factor	9,190	(3.2%)	9	(2.5%)	3	(0.3%)	$18.7	(2.1%)
Not reported (Captured under Broad Cause or Human Factor)	52,350	(18.2%)	32	(9.3%)	112	(9.7%)	$259.6	(28.7%)
Other known factor	18,370	(6.4%)	6	(1.9%)	204	(17.6%)	$41.4	(4.6%)
Total	288,220	(100.0%)	350	(100.0%)	1,154	(100.0%)	$904.1	(100.0%)

* Conversion rules for data originally collected in Version 4.1 of NFIRS make double-counting common.
Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors, or because in Version 5.0 of NFIRS, more than one factor contributing to ignition could be entered. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the factor contributing to ignition was undetermined were allocated proportionally among fires with known factor contributing to ignition.
Source: NFIRS and NFPA survey.

Table 11B.
1999 U.S. Highway Vehicle Fires, by Broad Cause

Broad Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Failure of equipment or heat source	192,800	(66.9%)	35	(9.9%)	478	(41.4%)	$496.1	(54.9%)
Intentional	45,900	(15.9%)	28	(8.0%)	85	(7.3%)	$204.5	(22.6%)
Unintentional	40,370	(14.0%)	264	(75.3%)	557	(48.2%)	$174.2	(19.3%)
Unclassified cause	8,610	(3.0%)	24	(6.8%)	35	(3.0%)	$28.2	(3.1%)
Act of nature	540	(0.2%)	0	(0.0%)	0	(0.0%)	$1.2	(0.1%)
Total	288,220	(100.0%)	350	(100.0%)	1,154	(100.0%)	$904.1	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the broad cause was under investigation, undetermined or not reported were allocated proportionally among fires with known cause.

Source: NFIRS and NFPA survey.

Table 11C.
U.S. Highway Vehicle Fires, by Ignition Factor
1994-1998 Annual Averages

Ignition Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Part failure, leak or break	63,260	(19.0%)	21	(4.9%)	278	(15.9%)	$139.8	(16.0%)
Short circuit or ground fault	60,690	(18.3%)	4	(1.0%)	196	(11.2%)	$131.8	(15.1%)
Incendiary or suspicious	54,900	(16.5%)	38	(8.8%)	93	(5.3%)	$220.9	(25.2%)
Backfire	34,690	(10.4%)	4	(1.0%)	171	(9.8%)	$52.1	(6.0%)
Unclassified or unknown-type mechanical failure or malfunction	29,310	(8.8%)	10	(2.3%)	96	(5.5%)	$77.0	(8.8%)
Electrical failure other than short circuit or ground fault	21,260	(6.4%)	2	(0.6%)	46	(2.6%)	$59.8	(6.8%)
Lack of maintenance	7,670	(2.3%)	1	(0.3%)	22	(1.3%)	$8.6	(1.0%)
Fuel spilled or unintentionally released	7,360	(2.2%)	23	(5.4%)	132	(7.6%)	$21.7	(2.5%)
Property too close	7,220	(2.2%)	10	(2.2%)	18	(1.0%)	$22.4	(2.6%)
Unclassified ignition factor	6,900	(2.1%)	16	(3.6%)	38	(2.2%)	$21.2	(2.4%)
Collision, overturn or knock down	6,160	(1.9%)	263	(60.6%)	276	(15.8%)	$51.8	(5.9%)
Combustible too close to heat	6,060	(1.8%)	6	(1.3%)	52	(3.0%)	$10.7	(1.2%)
Abandoned material	5,190	(1.6%)	6	(1.4%)	53	(3.0%)	$9.9	(1.1%)
Unclassified or unknown-type operational deficiency	3,450	(1.0%)	3	(0.7%)	26	(1.5%)	$9.8	(1.1%)
Other known ignition factor	18,170	(5.5%)	25	(5.8%)	250	(14.3%)	$38.0	(4.3%)
Total	332,280	(100.0%)	434	(100.0%)	1,747	(100.0%)	$875.6	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Table 12A.
1999 U.S. Highway Vehicle Fires, by Factor Contributing to Ignition Grouping

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Misuse of material or product	**20,090**	**(7.0%)**	**22**	**(6.2%)**	**263**	**(22.8%)**	**$53.4**	**(5.9%)**
Flammable liquid or gas spilled	5,160	(1.8%)	17	(4.9%)	86	(7.4%)	$23.5	(2.6%)
Heat source too close to combustibles	4,950	(1.7%)	0	(0.0%)	21	(1.8%)	$9.8	(1.1%)
Abandoned or discarded materials or products	4,560	(1.6%)	0	(0.0%)	38	(3.3%)	$9.0	(1.0%)
Mechanical failure or malfunction	**113,170**	**(39.3%)**	**28**	**(8.0%)**	**345**	**(29.9%)**	**$266.4**	**(29.5%)**
Leak or break	51,510	(17.9%)	19	(5.6%)	186	(16.1%)	$131.2	(14.5%)
Backfire	21,930	(7.6%)	2	(0.6%)	83	(7.2%)	$34.9	(3.9%)
Worn out	7,150	(2.5%)	0	(0.0%)	6	(0.5%)	$11.0	(1.2%)
Unclassified or unknown-type mechanical failure or malfunction	31,850	(11.0%)	6	(1.9%)	68	(5.9%)	$87.9	(9.7%)
Electrical failure or malfunction*	**107,950**	**(37.5%)**	**4**	**(1.2%)**	**201**	**(17.4%)**	**$269.3**	**(29.8%)**
Unspecified short circuit arc*	59,020	(20.5%)	2	(0.6%)	89	(7.7%)	$141.9	(15.7%)
Unclassified or unknown-type electrical failure or malfunction*	20,510	(7.1%)	0	(0.0%)	35	(3.1%)	$63.9	(7.1%)
Short circuit arc from defective or worn insulation*	14,780	(5.1%)	0	(0.0%)	21	(1.8%)	$32.1	(3.6%)
Short circuit arc from mechanical damage*	8,490	(2.9%)	2	(0.6%)	32	(2.8%)	$19.2	(2.1%)
Design, manufacturing or installation deficiency	**2,980**	**(1.0%)**	**0**	**(0.0%)**	**12**	**(1.0%)**	**$6.0**	**(0.7%)**
Operational deficiency	**15,270**	**(5.3%)**	**229**	**(65.4%)**	**286**	**(24.8%)**	**$92.6**	**(10.2%)**
Collision, knock down, or overturn	5,860	(2.0%)	229	(65.4%)	233	(20.2%)	$68.6	(7.6%)
Overloaded equipment	4,280	(1.5%)	0	(0.0%)	15	(1.3%)	$11.6	(1.3%)
Unclassified or unknown-type operational deficiency	3,540	(1.2%)	0	(0.0%)	3	(0.3%)	$8.6	(0.9%)
Natural condition	**1,460**	**(0.5%)**	**2**	**(0.6%)**	**6**	**(0.5%)**	**$4.4**	**(0.5%)**
Fire spread or control	**9,640**	**(3.3%)**	**4**	**(1.2%)**	**15**	**(1.3%)**	**$33.9**	**(3.7%)**
Exposure to other fire	8,580	(3.0%)	4	(1.2%)	9	(0.8%)	$31.4	(3.5%)
Unclassified factor contributed	**8,810**	**(3.1%)**	**24**	**(6.8%)**	**41**	**(3.6%)**	**$29.9**	**(3.3%)**
None	**9,190**	**(3.2%)**	**9**	**(2.5%)**	**3**	**(0.3%)**	**$18.7**	**(2.1%)**

* Conversion rules for data originally collected in Version 4.1 of NFIRS make double-counting common.

Table 12A.
1999 U.S. Highway Vehicle Fires, by Factor Contributing to Ignition Grouping
(Continued)

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Not reported (Captured under Broad Cause or Human Factor)	**52,350**	**(18.2%)**	**32**	**(9.3%)**	**112**	**(9.7%)**	**$259.6**	**(28.7%)**
Total	**288,220**	**(100.0%)**	**350**	**(100.0%)**	**1,154**	**(100.0%)**	**$904.1**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors, or because in Version 5.0 of NFIRS, more than one factor contributing to ignition could be entered. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the factor contributing to ignition was undetermined were allocated proportionally among fires with known factor contributing to ignition.

Source: NFIRS and NFPA survey.

Table 12B.
U.S. Highway Vehicle Fires, by Ignition Factor Grouping
1994-1998 Annual Averages

Ignition Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Mechanical or electrical failure	**217,720**	**(65.5%)**	**46**	**(10.6%)**	**813**	**(46.5%)**	**$471.2**	**(53.8%)**
Part failure, leak or break	63,260	(19.0%)	21	(4.9%)	278	(15.9%)	$139.8	(16.0%)
Short circuit or ground fault	60,690	(18.3%)	4	(1.0%)	196	(11.2%)	$131.8	(15.1%)
Backfire	34,690	(10.4%)	4	(1.0%)	171	(9.8%)	$52.1	(6.0%)
Electrical failure other than short circuit or ground fault	21,260	(6.4%)	2	(0.6%)	46	(2.6%)	$59.8	(6.8%)
Lack of maintenance	7,670	(2.3%)	1	(0.3%)	22	(1.3%)	$8.6	(1.0%)
Unclassified or unknown-type mechanical failure or malfunction	29,310	(8.8%)	10	(2.3%)	96	(5.5%)	$77.0	(8.8%)
Intentional	**54,900**	**(16.5%)**	**38**	**(8.8%)**	**93**	**(5.3%)**	**$220.9**	**(25.2%)**
Misuse of material ignited	**16,900**	**(5.1%)**	**33**	**(7.5%)**	**277**	**(15.9%)**	**$39.0**	**(4.4%)**
Fuel spilled or unintentionally released	7,360	(2.2%)	23	(5.4%)	132	(7.6%)	$21.7	(2.5%)
Combustible too close to heat	6,060	(1.8%)	6	(1.3%)	52	(3.0%)	$10.7	(1.2%)
Operational deficiency	**13,120**	**(3.9%)**	**268**	**(61.8%)**	**334**	**(19.1%)**	**$71.1**	**(8.1%)**
Collision, overturn or knock down	6,160	(1.9%)	263	(60.6%)	276	(15.8%)	$51.8	(5.9%)
Unclassified or unknown-type operational deficiency	3,450	(1.0%)	3	(0.7%)	26	(1.5%)	$9.8	(1.1%)
Design, construction or installation deficiency	**11,600**	**(3.5%)**	**13**	**(3.1%)**	**46**	**(2.7%)**	**$28.3**	**(3.2%)**
Property too close	7,220	(2.2%)	10	(2.2%)	18	(1.0%)	$22.4	(2.6%)
Misuse of heat of ignition	**10,110**	**(3.0%)**	**19**	**(4.5%)**	**142**	**(8.1%)**	**$20.9**	**(2.4%)**
Abandoned material	5,190	(1.6%)	6	(1.4%)	53	(3.0%)	$9.9	(1.1%)
Natural condition	**340**	**(0.1%)**	**0**	**(0.0%)**	**3**	**(0.2%)**	**$1.3**	**(0.2%)**
Other ignition factor	**7,590**	**(2.3%)**	**16**	**(3.7%)**	**39**	**(2.2%)**	**$22.8**	**(2.6%)**
Unclassified ignition factor	6,900	(2.1%)	16	(3.6%)	38	(2.2%)	$21.2	(2.4%)
Total	**332,280**	**(100.0%)**	**434**	**(100.0%)**	**1,747**	**(100.0%)**	**$875.6**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Table 13A.
1999 U.S. Highway Vehicle Fires, by Area of Fire Origin

Area of Fire Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine area, running gear or wheel area	193,200	(67.0%)	150	(42.8%)	559	(48.5%)	$508.9	(56.3%)
Operator and passenger area (combination area)	47,820	(16.6%)	55	(15.7%)	209	(18.1%)	$186.2	(20.6%)
Exterior, exposed vehicle surface	8,780	(3.0%)	6	(1.8%)	40	(3.5%)	$26.7	(3.0%)
Unclassified vehicle area	8,560	(3.0%)	34	(9.6%)	45	(3.9%)	$30.6	(3.4%)
Cargo or trunk area	8,040	(2.8%)	13	(3.6%)	86	(7.4%)	$39.3	(4.3%)
Fuel tank or fuel line	4,290	(1.5%)	65	(18.7%)	111	(9.6%)	$35.6	(3.9%)
Separate operator or control area	4,250	(1.5%)	6	(1.8%)	15	(1.3%)	$19.4	(2.1%)
On or near highway, parking lot or street	3,740	(1.3%)	13	(3.6%)	23	(2.0%)	$11.7	(1.3%)
Unclassified area of origin	2,930	(1.0%)	2	(0.6%)	5	(0.4%)	$8.7	(1.0%)
Other known area	6,610	(2.3%)	6	(1.8%)	60	(5.2%)	$37.1	(4.1%)
Total	288,220	(100.0%)	350	(100.0%)	1,154	(100.0%)	$904.1	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the area or origin was unknown or not reported were allocated proportionally among fires with known area of origin.

Source: NFIRS and NFPA survey.

Table 13B.
U.S. Highway Vehicle Fires, by Area of Fire Origin
1994-1998 Annual Averages

Area of Fire Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine, running gear or wheel area of vehicle	223,760	(67.3%)	161	(37.1%)	908	(52.0%)	$488.9	(55.8%)
Passenger area of vehicle	57,160	(17.2%)	81	(18.6%)	327	(18.7%)	$199.7	(22.8%)
Exterior surface of vehicle	9,780	(2.9%)	10	(2.3%)	60	(3.4%)	$26.9	(3.1%)
Cargo or trunk area of vehicle	8,410	(2.5%)	17	(3.9%)	102	(5.8%)	$28.8	(3.3%)
Unclassified vehicle area	6,780	(2.0%)	28	(6.4%)	40	(2.3%)	$21.4	(2.4%)
Separate operating or control area of vehicle	4,900	(1.5%)	5	(1.3%)	27	(1.5%)	$20.1	(2.3%)
Fuel tank or fuel line of vehicle	4,640	(1.4%)	93	(21.4%)	157	(9.0%)	$23.6	(2.7%)
On or near highway, public way or street	3,720	(1.1%)	18	(4.2%)	25	(1.4%)	$13.2	(1.5%)
Other known area	13,130	(4.0%)	21	(4.8%)	103	(5.9%)	$52.9	(6.0%)
Total	332,280	(100.0%)	434	(100.0%)	1,747	(100.0%)	$875.6	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the area or origin was unknown or not reported were allocated proportionally among fires with known area of origin.

Source: NFIRS and NFPA survey.

Table 14A.
1999 U.S. Highway Vehicle Fires, by Item First Ignited

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Electrical wire or cable insulation	77,530	(26.9%)	6	(1.8%)	111	(9.6%)	$187.2	(20.7%)
Flammable or combustible liquid or gas in or from final container	60,380	(20.9%)	213	(60.7%)	402	(34.8%)	$198.1	(21.9%)
Unclassified item	43,660	(15.1%)	38	(10.7%)	135	(11.7%)	$122.0	(13.5%)
Multiple items first ignited	32,840	(11.4%)	31	(8.9%)	98	(8.5%)	$137.5	(15.2%)
Upholstered sofa, chair or vehicle seat	20,930	(7.3%)	22	(6.3%)	89	(7.7%)	$80.8	(8.9%)
Flammable or combustible liquid or gas in a container or pipe	11,430	(4.0%)	16	(4.5%)	101	(8.8%)	$42.8	(4.7%)
Tire	4,970	(1.7%)	0	(0.0%)	21	(1.9%)	$24.2	(2.7%)
Rubbish, trash, or waste	3,700	(1.3%)	0	(0.0%)	9	(0.8%)	$7.5	(0.8%)
Unclassified or unknown-type liquid, piping or filter	3,360	(1.2%)	0	(0.0%)	40	(3.5%)	$7.9	(0.9%)
Flammable or combustible liquid or gas in or from engine or burner	2,760	(1.0%)	3	(0.9%)	3	(0.3%)	$4.9	(0.5%)
Other known item	26,670	(9.3%)	22	(6.3%)	144	(12.5%)	$91.3	(10.1%)
Total	288,220	(100.0%)	350	(100.0%)	1,154	(100.0%)	$904.1	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the item first ignited was unknown or not reported were allocated proportionally among fires with known item first ignited.

Source: NFIRS and NFPA survey.

Table 14B.
U.S. Highway Vehicle Fires, by Form of Material First Ignited
1994-1998 Annual Averages

Form of Material	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Fuel	90,180	(27.1%)	244	(56.3%)	752	(43.1%)	$220.1	(25.1%)
Electrical wire or cable insulation	88,340	(26.6%)	8	(1.7%)	226	(12.9%)	$179.9	(20.5%)
Unclassified form of material	38,810	(11.7%)	31	(7.1%)	152	(8.7%)	$100.8	(11.5%)
Multiple forms of material	31,590	(9.5%)	54	(12.4%)	119	(6.8%)	$127.4	(14.6%)
Upholstered furniture	23,410	(7.0%)	17	(3.9%)	84	(4.8%)	$77.5	(8.8%)
Accelerant or gas or liquid in or from pipe or container	13,270	(4.0%)	35	(8.0%)	139	(8.0%)	$42.0	(4.8%)
Unclassified or unknown-type power transfer equipment or fuel	9,380	(2.8%)	3	(0.7%)	32	(1.8%)	$23.4	(2.7%)
Tire	5,200	(1.6%)	6	(1.3%)	20	(1.2%)	$19.0	(2.2%)
Rubbish, trash or waste	3,930	(1.2%)	2	(0.5%)	24	(1.4%)	$5.7	(0.7%)
Form of material not applicable	3,170	(1.0%)	5	(1.1%)	10	(0.6%)	$9.3	(1.1%)
Other known form	25,010	(7.5%)	31	(7.1%)	190	(10.9%)	$70.4	(8.0%)
Total	332,280	(100.0%)	434	(100.0%)	1,747	(100.0%)	$875.6	(100.0%)

* Unclassified or unknown-type other form includes code 99, "Unclassified form of material," and code 90, an unassigned code in the "Other form of material" category.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the form of material first ignited was unknown or not reported were allocated proportionally among fires with known form of material first ignited.

Source: NFIRS and NFPA survey.

Table 15. U.S. Highway Vehicle Fires, by Type of Material First Ignited
1994-1998 Annual Averages

Type of Material	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible liquid	**115,720**	**(34.8%)**	**291**	**(67.1%)**	**888**	**(50.8%)**	**$288.9**	**(33.0%)**
Gasoline	91,840	(27.6%)	245	(56.5%)	732	(41.9%)	$213.4	(24.4%)
Class IIIB combustible liquid	9,230	(2.8%)	1	(0.2%)	30	(1.7%)	$14.6	(1.7%)
Class IA flammable liquid	3,170	(1.0%)	6	(1.3%)	38	(2.2%)	$8.3	(0.9%)
Unclassified or unknown-type flammable or combustible liquid	7,480	(2.3%)	10	(2.4%)	38	(2.2%)	$23.8	(2.7%)
Plastic	**77,300**	**(23.3%)**	**15**	**(3.5%)**	**234**	**(13.4%)**	**$174.8**	**(20.0%)**
Polyvinyl	22,650	(6.8%)	1	(0.2%)	55	(3.1%)	$53.5	(6.1%)
Polyurethane	5,290	(1.6%)	2	(0.5%)	14	(0.8%)	$13.5	(1.5%)
Unclassified or unknown-type plastic	46,010	(13.8%)	12	(2.7%)	148	(8.5%)	$98.4	(11.2%)
Natural product	**32,710**	**(9.8%)**	**12**	**(2.8%)**	**119**	**(6.8%)**	**$71.3**	**(8.1%)**
Rubber	28,230	(8.5%)	6	(1.5%)	95	(5.5%)	$58.8	(6.7%)
Grass, leaves, hay or straw	3,290	(1.0%)	5	(1.1%)	18	(1.1%)	$7.8	(0.9%)
Fabric, textile or fur	**25,700**	**(7.7%)**	**17**	**(3.8%)**	**114**	**(6.5%)**	**$73.4**	**(8.4%)**
Manufactured fabric, fiber or finished goods	15,280	(4.6%)	10	(2.2%)	63	(3.6%)	$46.6	(5.3%)
Cotton or rayon fabric or finished goods	6,830	(2.1%)	5	(1.1%)	32	(1.8%)	$17.2	(2.0%)
Unclassified fabric, textile or fur	3,250	(1.0%)	2	(0.5%)	17	(1.0%)	$8.9	(1.0%)
Gas	**8,010**	**(2.4%)**	**25**	**(5.7%)**	**134**	**(7.7%)**	**$26.8**	**(3.1%)**
Unclassified or unknown-type gas	4,640	(1.4%)	11	(2.5%)	34	(2.0%)	$11.1	(1.3%)
Wood or paper	**7,880**	**(2.4%)**	**4**	**(1.0%)**	**42**	**(2.4%)**	**$25.2**	**(2.9%)**
Volatile solid or chemical	**7,070**	**(2.1%)**	**5**	**(1.2%)**	**24**	**(1.4%)**	**$14.9**	**(1.7%)**
Grease (nonfood)	3,940	(1.2%)	1	(0.2%)	8	(0.5%)	$6.0	(0.7%)
Material compounded with oil	**4,390**	**(1.3%)**	**2**	**(0.4%)**	**8**	**(0.5%)**	**$9.2**	**(1.1%)**
Other type of material	**53,500**	**(16.1%)**	**63**	**(14.5%)**	**184**	**(10.5%)**	**$190.9**	**(21.8%)**
Multiple types of material ignited	30,390	(9.1%)	48	(11.1%)	108	(6.2%)	$123.6	(14.1%)
Unclassified	20,950	(6.3%)	13	(3.1%)	73	(4.2%)	$62.0	(7.1%)
Total	**332,280**	**(100.0%)**	**434**	**(100.0%)**	**1,747**	**(100.0%)**	**$875.6**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property is rounded damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the type of material first ignited was unknown or not reported were allocated proportionally among fires with known type of material first ignited.

Source: NFIRS and NFPA survey.

U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem

An estimated 9,300 of these fires were reported in 1999.
During 1999, an estimated 9,300 heavy industrial, agricultural, construction, special and miscellaneous vehicle fires were reported to U.S. fire departments. These fires caused an estimated 15 civilian deaths, 69 civilian fire injuries and $105,600,000 in direct property damage. These vehicle fires rose 4% from 8,960 in 1998 to 9,300 in 1999. Since 1980, they have fallen only 9%. (See Table 16.)

An estimated average of 8,450 of these vehicle fires were reported per year during the five-year period of 1994 through 1998. During this time, these fires caused an annual average of nine civilian fire deaths, 94 civilian fire injuries, and $86,500,000 in direct property damage per year.

These vehicles accounted for 2-3% of all vehicle fires.
In 1999, industrial, agricultural, construction, special and miscellaneous vehicles accounted for 3% of the 369,090 reported vehicle fires, 3% of the 469 vehicle fire deaths, 4% of the 1,846 civilian injuries, and 8% of the $1,323,200,000 in direct property damage.

During 1994-1998, these vehicle fires accounted for an average of 2% of the 399,940 reported vehicle fires, 2% of the 586 civilian deaths, 4% of the 2,346 civilian injuries and 7% of the $1,240,700,000 in direct property loss. (See Table 2.)

Agricultural vehicles accounted for largest share of fires in this group .
Table 17 shows that agricultural vehicles, including balers, tractors, harvesters and pickers, accounted for 43-51% of the fires in this category. Construction or earth moving equipment accounted for 16-17% of these incidents, home or garden vehicles accounted for 12-13%, and materials handling equipment, such as forklifts, loaders, stackers or industrial tow motors, accounted for 6% of these fires.

These fires were more common during the afternoon.
Month, day of week, and time of day patterns are displayed in Tables 18, 19 and 20. October, with 16-25%, of these fires, was the peak month for these incidents in both 1999 and the 1994-1998 period. These fires were much less common from December through March. Fires by day of week showed a drop-off on the weekend, as Sunday had the smallest share (9%), followed by Saturday (13%). Fifty-two to fifty-three percent of the fires occurred between noon and 6:00 p.m. An additional 17% occurred in the morning from 9:00 a.m. to noon. These fires were much less common between 9:00 p.m. and 9:00 a.m.

These fires occurred on or in a variety of properties.
Table 21 shows that 22-24% of these vehicle fires occurred on open land or in fields; 10-12% were in crops or orchards; and 9-10% occurred on public streets or driveways.

About two-thirds of these fires resulted from equipment failure.
The causes of these vehicle fires are shown in Tables 22 and 23. Roughly one of every four (23-25%) of these fires was caused by a part failure, leak or break. Some form of mechanical or electrical failure (including part failures and short circuits) was involved in 66% of these fires in 1994-1998. In 1999, 68% of these fires were caused by a failure of equipment or heat source. Only 4-5% of these fires were intentionally set.

Table 24 shows that 61-62% of the fires in heavy equipment vehicles began in the engine, running gear, or wheel area.

Natural products and flammable or combustible liquids were the most common types of material first ignited.
Tables 25 and 26 show the item or form of material first ignited. Due to changes in the coding rules for Version 5.0 of NFIRS, the type of material first ignited is shown for the 1994-1998 period only. The top three items or forms first ignited were the same for both periods although the ranking changed, possibly influenced by some changes in the coding. The top three include: 1) agricultural crops, 2) fuel or flammable liquid or gas in or from its final container, and 3) electrical wire or cable insulation.

Some type of flammable or combustible liquid was first ignited in 32% of these incidents in the 1994-1998 period, with gasoline first ignited in 17% of the fires. A natural product was first ignited in 26% of the fires, with grass, leaves, hay or straw accounting for 13% of the incidents. Rubber, also considered a natural product, was first ignited in 7% of these fires.

Some type of plastic product was first ignited in 14% of these fires.

Table 16.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Year: 1980-1999

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)	Loss in 1999 Dollars
1980	10,170	3	238	$44.1	$89.3
1981	10,160	12	122	$31.3	$57.2
1982	9,770	17	156	$39.2	$67.7
1983	9,410	4	175	$52.9	$88.5
1984	9,720	4	160	$57.7	$92.4
1985	9,600	12	202	$40.3	$62.3
1986	9,680	10	146	$35.6	$54.2
1987	10,400	9	120	$47.1	$69.1
1988	9,200	6	67	$70.8	$99.9
1989	8,610	7	117	$54.7	$73.6
1990	8,470	10	130	$68.1	$86.9
1991	8,390	7	108	$68.2	$83.5
1992	7,210	4	97	$54.1	$64.3
1993	8,070	10	62	$58.9	$67.9
1994	8,240	3	70	$86.4	$97.3
1995	8,240	14	114	$75.8	$82.8
1996	7,590	4	102	$61.1	$65.0
1997	9,240	8	92	$93.5	$97.1
1998	8,960	16	92	$115.6	$118.3
1980-1998 Annual average	9,010	8	125	$60.8	$79.9
1994-1998 Annual average	8,450	9	94	$86.5	$92.1
1999*	9,300	15	69	$105.6	$105.6

* NFIRS data for 1999 was received in the Version 5.0 format involves enough coding changes that it can better be analyzed separately from data from previous years.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation.
Source: NFIRS and NFPA survey, "Purchasing Power of the Dollar" custom table from Bureau of Labor Statistics at http://www.bls.gov/cpi/..

Table 17A.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Type of Vehicle

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Industrial, agricultural or construction vehicle	**7,680**	**(82.6%)**	**12**	**(77.8%)**	**47**	**(69.0%)**	**$100.6**	**(95.3%)**
Agricultural vehicle, baler, chopper for farm use	4,720	(50.7%)	2	(11.1%)	28	(41.4%)	$46.4	(43.9%)
Construction or earth moving vehicle	1,470	(15.8%)	5	(33.3%)	14	(20.7%)	$27.7	(26.2%)
Materials handling equipment, e.g., forklift, loader, stacker or industrial tow motor	580	(6.2%)	5	(33.3%)	5	(6.9%)	$6.9	(6.5%)
Crane	70	(0.8%)	0	(0.0%)	0	(0.0%)	$2.3	(2.2%)
Timber harvest vehicle	30	(0.3%)	0	(0.0%)	0	(0.0%)	$2.0	(1.9%)
Drilling rig for petroleum and gas only	10	(0.1%)	0	(0.0%)	0	(0.0%)	$0.4	(0.4%)
Unclassified or unknown-type industrial, agricultural or construction vehicle	810	(8.7%)	0	(0.0%)	0	(0.0%)	$15.0	(14.2%)
Special or miscellaneous vehicle	**1,620**	**(17.4%)**	**3**	**(22.2%)**	**21**	**(31.0%)**	**$5.0**	**(4.7%)**
Home or garden vehicle	1,180	(12.7%)	3	(22.2%)	21	(31.0%)	$1.6	(1.5%)
Armored vehicle	20	(0.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Mechanically moved waste container	0	(0.0%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Unclassified or unknown-type special vehicle	410	(4.5%)	0	(0.0%)	0	(0.0%)	$3.4	(3.2%)
Total	**9,300**	**(100.0%)**	**15**	**(100.0%)**	**69**	**(100.0%)**	**$105.6**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 17B.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Type of Vehicle 1994-1998 Annual Averages

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Property Damage (in Millions)	
Heavy equipment	**6,260**	**(74.0%)**	**7**	**(75.6%)**	**64**	**(68.5%)**	**$77.2**	**(89.3%)**
Tractor, harvester or picker	3,620	(42.8%)	5	(51.1%)	28	(29.8%)	$35.0	(40.4%)
Earth moving equipment	930	(11.0%)	0	(4.4%)	8	(8.7%)	$15.8	(18.2%)
Materials handling equipment, e.g., forklift, loader, stacker or industrial tow motor	540	(6.3%)	1	(11.1%)	9	(9.8%)	$5.0	(5.8%)
Construction equipment	360	(4.3%)	0	(0.0%)	8	(8.9%)	$4.7	(5.4%)
Crane	90	(1.0%)	0	(0.0%)	2	(2.6%)	$3.1	(3.6%)
Armored equipment	20	(0.2%)	0	(0.0%)	0	(0.4%)	$0.0	(0.1%)
Drill rig for petroleum or gas	10	(0.1%)	0	(4.4%)	1	(0.6%)	$0.7	(0.8%)
Space vehicle	0	(0.0%)	0	(0.0%)	0	(0.0%)	$0.2	(0.2%)
Unclassified or unknown-type heavy equipment	690	(8.2%)	0	(4.4%)	7	(7.7%)	$12.8	(14.8%)
Special vehicle	**2,200**	**(26.0%)**	**2**	**(24.4%)**	**30**	**(31.5%)**	**$9.3**	**(10.7%)**
Garden equipment	1,020	(12.1%)	1	(15.6%)	18	(19.1%)	$1.3	(1.5%)
Unclassified or unknown-type special vehicle	1,170	(13.9%)	1	(8.9%)	12	(12.3%)	$7.9	(9.2%)
Total	**8,450**	**(100.0%)**	**9**	**(100.0%)**	**94**	**(100.0%)**	**$86.5**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 18A.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem
by Month

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	360	(3.9%)	5	(33.3%)	0	(0.0%)	$3.1	(3.0%)
February	300	(3.3%)	2	(11.1%)	2	(3.4%)	$3.6	(3.4%)
March	420	(4.5%)	0	(0.0%)	7	(10.3%)	$8.3	(7.9%)
April	590	(6.3%)	2	(11.1%)	5	(6.9%)	$9.3	(8.8%)
May	750	(8.1%)	0	(0.0%)	5	(6.9%)	$7.1	(6.7%)
June	780	(8.4%)	2	(11.1%)	21	(31.0%)	$6.6	(6.2%)
July	920	(9.9%)	0	(0.0%)	0	(0.0%)	$9.3	(8.8%)
August	700	(7.5%)	2	(11.1%)	2	(3.4%)	$8.5	(8.1%)
September	960	(10.4%)	2	(11.1%)	5	(6.9%)	$9.5	(9.0%)
October	2,360	(25.4%)	2	(11.1%)	14	(20.7%)	$23.7	(22.5%)
November	860	(9.2%)	0	(0.0%)	5	(6.9%)	$11.7	(11.0%)
December	280	(3.1%)	0	(0.0%)	2	(3.4%)	$5.0	(4.7%)
Total	9,300	(100.0%)	15	(100.0%)	69	(100.0%)	$105.6	(100.0%)
Monthly average	770	(8.3%)	1	(8.3%)	6	(8.3%)	$8.8	(8.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 18B.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem
by Month
1994-1998 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	380	(4.5%)	1	(8.5%)	3	(3.3%)	$3.2	(3.7%)
February	360	(4.2%)	0	(4.3%)	5	(5.6%)	$4.2	(4.9%)
March	460	(5.5%)	0	(0.0%)	6	(6.3%)	$6.1	(7.0%)
April	610	(7.2%)	1	(14.9%)	8	(8.4%)	$5.5	(6.4%)
May	780	(9.3%)	1	(8.5%)	12	(12.8%)	$6.7	(7.8%)
June	870	(10.3%)	1	(12.8%)	13	(13.8%)	$9.8	(11.3%)
July	950	(11.2%)	2	(23.4%)	9	(9.4%)	$8.0	(9.2%)
August	790	(9.4%)	1	(10.6%)	10	(10.9%)	$8.2	(9.5%)
September	810	(9.6%)	1	(8.5%)	11	(11.7%)	$8.7	(10.0%)
October	1,340	(15.8%)	1	(8.5%)	7	(7.7%)	$13.7	(15.9%)
November	690	(8.2%)	0	(0.0%)	5	(5.4%)	$7.2	(8.3%)
December	400	(4.7%)	0	(0.0%)	4	(4.6%)	$5.2	(6.0%)
Total	8,450	(100.0%)	9	(100.0%)	96	(100.0%)	$86.5	(100.0%)
Monthly average	700	(8.3%)	1	(8.3%)	8	(8.3%)	$7.2	(8.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 19A.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem
by Day of Week

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	840	(9.0%)	2	(11.1%)	5	(6.9%)	$8.0	(7.6%)
Monday	1,310	(14.1%)	2	(11.1%)	7	(10.3%)	$14.7	(13.9%)
Tuesday	1,350	(14.5%)	9	(55.6%)	17	(24.1%)	$16.2	(15.4%)
Wednesday	1,410	(15.2%)	3	(22.2%)	14	(20.7%)	$19.0	(18.0%)
Thursday	1,660	(17.8%)	0	(0.0%)	14	(20.7%)	$20.3	(19.3%)
Friday	1,490	(16.0%)	0	(0.0%)	7	(10.3%)	$15.7	(14.9%)
Saturday	1,250	(13.5%)	0	(0.0%)	5	(6.9%)	$11.6	(11.0%)
Total	9,300	(100.0%)	15	(100.0%)	69	(100.0%)	$105.6	(100.0%)
Daily average	1,330	(14.3%)	2	(14.3%)	10	(14.3%)	$15.1	(14.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the day of week was unknown or not reported have been allocated proportionally among fires with known day of week.

Source: NFIRS and NFPA survey.

Table 19B.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem
by Day of Week
1994-1998 Annual Averages

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	770	(9.1%)	0	(3.6%)	9	(9.6%)	$6.2	(7.2%)
Monday	1,340	(15.8%)	1	(13.2%)	17	(17.7%)	$16.9	(19.5%)
Tuesday	1,300	(15.4%)	1	(13.3%)	18	(18.8%)	$12.6	(14.5%)
Wednesday	1,330	(15.7%)	1	(8.4%)	15	(16.4%)	$14.8	(17.2%)
Thursday	1,280	(15.1%)	1	(15.8%)	19	(19.8%)	$12.4	(14.3%)
Friday	1,300	(15.4%)	3	(33.4%)	9	(9.8%)	$13.8	(15.9%)
Saturday	1,130	(13.4%)	1	(12.1%)	7	(7.9%)	$9.9	(11.4%)
Total	8,450	(100.0%)	9	(100.0%)	94	(100.0%)	$86.5	(100.0%)
Daily average	1,210	(14.3%)	1	(14.3%)	12	(14.3%)	$12.4	(14.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the day of week was unknown or not reported have been allocated proportionally among fires with known day of week.

Source: NFIRS and NFPA survey.

Table 20A.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Time of Day

Time of Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
12:01 - 3:00 a.m.	290	(3.1%)	0	(0.0%)	2	(3.4%)	$4.3	(4.0%)
3:01 - 6:00 a.m.	230	(2.5%)	0	(0.0%)	2	(3.4%)	$4.8	(4.5%)
6:01 - 9:00 a.m.	510	(5.5%)	0	(0.0%)	0	(0.0%)	$4.5	(4.3%)
9:01 - Noon	1,550	(16.7%)	3	(22.2%)	2	(3.4%)	$21.1	(20.0%)
12:01 - 3:00 p.m.	2,350	(25.2%)	7	(44.4%)	33	(48.3%)	$27.7	(26.2%)
3:01 - 6:00 p.m.	2,620	(28.1%)	3	(22.2%)	21	(31.0%)	$23.0	(21.8%)
6:01 - 9:00 p.m.	1,350	(14.5%)	0	(0.0%)	7	(10.3%)	$13.2	(12.5%)
9:01 - Midnight	390	(4.2%)	2	(11.1%)	0	(0.0%)	$7.1	(6.7%)
Total	9,300	(100.0%)	15	(100.0%)	69	(100.0%)	$105.6	(100.0%)
Average	1,160	(12.5%)	2	(12.5%)	9	(12.5%)	$13.2	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 20B.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem
by Time of Day
1994-1998 Annual Averages

Time of Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
12:01 - 3:00 a.m.	220	(2.6%)	0	(0.0%)	1	(0.9%)	$2.9	(3.3%)
3:01 - 6:00 a.m.	200	(2.3%)	0	(0.0%)	1	(1.5%)	$3.3	(3.8%)
6:01 - 9:00 a.m.	510	(6.0%)	1	(15.6%)	8	(8.5%)	$5.4	(6.2%)
9:01 - Noon	1,430	(17.0%)	1	(8.9%)	16	(16.6%)	$16.9	(19.5%)
Noon - 3:00 p.m.	2,190	(25.9%)	4	(40.0%)	26	(27.4%)	$21.9	(25.3%)
3:01 - 6:00 p.m.	2,230	(26.4%)	2	(20.0%)	23	(24.0%)	$20.8	(24.1%)
6:01 - 9:00 p.m.	1,190	(14.0%)	1	(15.6%)	15	(15.7%)	$10.7	(12.4%)
9:01 - Midnight	480	(5.7%)	0	(0.0%)	5	(5.3%)	$4.6	(5.4%)
Total	8,450	(100.0%)	9	(100.0%)	94	(100.0%)	$86.5	(100.0%)
Average	1,060	(12.5%)	1	(12.5%)	12	(12.5%)	$10.8	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 21A.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Fixed Property Use

Fixed Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Open land or field	2,260	(24.3%)	3	(22.2%)	17	(24.1%)	$23.1	(21.8%)
Crops or orchard	1,140	(12.3%)	0	(0.0%)	7	(10.3%)	$11.3	(10.7%)
Residential street, road or residential driveway	910	(9.8%)	0	(0.0%)	14	(20.7%)	$6.9	(6.6%)
Unclassified or unknown-type outside or special property	740	(8.0%)	0	(0.0%)	2	(3.4%)	$5.9	(5.5%)
Livestock production	610	(6.6%)	2	(11.1%)	2	(3.4%)	$5.5	(5.2%)
One- or two-family dwelling	430	(4.6%)	2	(11.1%)	9	(13.8%)	$1.1	(1.0%)
Unclassified or unknown-type street or parking property	350	(3.8%)	2	(11.1%)	0	(0.0%)	$2.4	(2.3%)
Vehicle parking area	340	(3.7%)	0	(0.0%)	2	(3.4%)	$4.4	(4.1%)
Highway or divided highway	170	(1.9%)	0	(0.0%)	2	(3.4%)	$1.8	(1.7%)
Manufacturing or processing property	160	(1.8%)	2	(11.1%)	2	(3.4%)	$4.3	(4.1%)
Vacant lot	120	(1.3%)	0	(0.0%)	0	(0.0%)	$1.2	(1.1%)
Warehouse	120	(1.3%)	0	(0.0%)	0	(0.0%)	$1.8	(1.7%)
Forest, timberland or woodland	120	(1.3%)	0	(0.0%)	0	(0.0%)	$3.6	(3.4%)
Construction site	120	(1.3%)	0	(0.0%)	2	(3.4%)	$3.3	(3.1%)
Other known property use	60	(0.7%)	0	(0.0%)	2	(3.4%)	$0.7	(0.7%)
Unclassified or unknown-type property use	930	(10.0%)	0	(0.0%)	2	(3.4%)	$12.5	(11.9%)
Total	9,300	(100.0%)	15	(100.0%)	69	(100.0%)	$105.6	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 21B.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem
by Fixed Property Use
1994-1998 Annual Averages

Fixed Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Open land or field	1,890	(22.3%)	3	(31.1%)	21	(21.9%)	$16.6	(19.2%)
Crop or orchard	830	(9.8%)	1	(8.9%)	4	(4.5%)	$9.3	(10.7%)
Paved public street	760	(9.0%)	0	(0.0%)	11	(11.7%)	$4.7	(5.5%)
One- or two-family dwelling	400	(4.8%)	0	(4.4%)	6	(6.2%)	$0.6	(0.7%)
Unclassified or unknown-type agricultural property	370	(4.4%)	1	(15.6%)	2	(2.6%)	$4.5	(5.2%)
Unclassified or unknown-type road property	310	(3.7%)	0	(4.4%)	2	(1.7%)	$3.5	(4.1%)
Uncovered parking area	300	(3.6%)	1	(8.9%)	2	(2.3%)	$1.9	(2.2%)
Unclassified or unknown-type outdoor property	280	(3.3%)	1	(8.9%)	6	(6.4%)	$2.0	(2.3%)
Unpaved street, road or path	220	(2.6%)	0	(4.4%)	3	(3.4%)	$1.9	(2.2%)
Vehicle storage property	200	(2.4%)	0	(0.0%)	2	(2.3%)	$1.5	(1.7%)
Limited access or divided highway	200	(2.3%)	0	(0.0%)	0	(0.0%)	$3.0	(3.4%)
Equipment operating area	180	(2.2%)	0	(4.4%)	2	(1.7%)	$5.6	(6.5%)
Paved private street or way	140	(1.7%)	0	(4.4%)	3	(3.0%)	$0.5	(0.6%)
Vacant lot	100	(1.1%)	0	(0.0%)	0	(0.4%)	$0.8	(1.0%)
Cow or cattle production	90	(1.1%)	0	(0.0%)	0	(0.4%)	$0.9	(1.0%)
Dump or sanitary landfill	90	(1.1%)	0	(0.0%)	1	(1.5%)	$2.4	(2.8%)
Forest or standing timber with logging	90	(1.0%)	0	(0.0%)	1	(0.6%)	$3.0	(3.5%)
Other known fixed property use	1,240	(14.6%)	0	(4.4%)	23	(24.9%)	$16.5	(19.0%)
Unclassified or unknown-type fixed property use	770	(9.1%)	0	(0.0%)	4	(4.5%)	$7.3	(8.5%)
Total	8,450	(100.0%)	9	(100.0%)	94	(100.0%)	$86.5	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 22A.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Factor Contributing to Ignition

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Leak or break	2,310	(24.9%)	0	(0.0%)	16	(24.0%)	$32.4	(30.6%)
Unspecified short circuit arc*	1,560	(16.8%)	0	(0.0%)	3	(4.0%)	$16.0	(15.2%)
Unclassified or unknown-type mechanical failure or malfunction	1,120	(12.0%)	0	(0.0%)	8	(12.0%)	$13.1	(12.4%)
Unclassified or unknown-type electrical failure or malfunction*	600	(6.4%)	0	(0.0%)	0	(0.0%)	$7.1	(6.7%)
Heat source too close to combustible	560	(6.0%)	0	(0.0%)	3	(4.0%)	$5.0	(4.7%)
Worn out	480	(5.2%)	3	(16.7%)	0	(0.0%)	$2.8	(2.6%)
Short circuit arc from defective or worn insulation*	380	(4.1%)	0	(0.0%)	0	(0.0%)	$3.1	(2.9%)
Backfire	290	(3.2%)	0	(0.0%)	3	(4.0%)	$1.7	(1.6%)
Unclassified or unknown-type operational deficiency	270	(2.9%)	0	(0.0%)	3	(4.0%)	$1.8	(1.7%)
Unclassified or unknown-type natural condition	270	(2.9%)	0	(0.0%)	0	(0.0%)	$1.8	(1.7%)
Unclassified	250	(2.7%)	0	(0.0%)	3	(4.0%)	$3.6	(3.4%)
Exposure fire	230	(2.5%)	0	(0.0%)	0	(0.0%)	$3.7	(3.5%)
Short circuit arc from mechanical damage*	210	(2.2%)	0	(0.0%)	5	(8.0%)	$2.3	(2.1%)
Flammable liquid or gas spilled	200	(2.2%)	3	(16.7%)	8	(12.0%)	$0.8	(0.7%)
Cutting, welding too close to combustible	190	(2.0%)	0	(0.0%)	0	(0.0%)	$1.1	(1.0%)
Equipment overloaded*	190	(2.0%)	0	(0.0%)	0	(0.0%)	$1.0	(1.0%)
Arc or spark from operating equipment*	130	(1.4%)	0	(0.0%)	0	(0.0%)	$1.5	(1.4%)
Collision, knock down, run over or overturn	90	(1.0%)	8	(50.0%)	8	(12.0%)	$1.0	(1.0%)
None	240	(2.6%)	0	(0.0%)	0	(0.0%)	$2.6	(2.5%)
Not reported (Captured under Broad Cause or Human Factor)	560	(6.0%)	0	(0.0%)	0	(0.0%)	$8.1	(7.6%)
Other known factor	620	(6.7%)	10	(66.7%)	14	(20.0%)	$9.9	(9.3%)
Total	9,300	(100.0%)	15	(100.0%)	69	(100.0%)	$105.6	(100.0%)

* Conversion rules for data originally collected in Version 4.1 of NFIRS make double-counting common.

Table 22A.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Factor Contributing to Ignition (Continued)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors, or because in Version 5.0 of NFIRS, more than one factor contributing to ignition could be entered. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the factor contributing to ignition was undetermined were allocated proportionally among fires with known factor contributing to ignition.

Source: NFIRS and NFPA survey.

Table 22B.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Broad Cause

Broad Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Failure of equipment or heat source	6,340	(68.2%)	3	(16.7%)	30	(44.0%)	$75.6	(71.6%)
Unintentional	2,220	(23.8%)	13	(83.3%)	36	(52.0%)	$17.9	(16.9%)
Intentional	400	(4.3%)	0	(0.0%)	0	(0.0%)	$9.2	(8.7%)
Unclassified cause	280	(3.1%)	0	(0.0%)	3	(4.0%)	$2.4	(2.3%)
Act of nature	60	(0.6%)	0	(0.0%)	0	(0.0%)	$0.5	(0.5%)
Total	9,300	(100.0%)	15	(100.0%)	69	(100.0%)	$105.6	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the broad cause was under investigation, undetermined or not reported were allocated proportionally among fires with known cause.

Source: NFIRS and NFPA survey.

Table 22C.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Ignition Factor 1994-1998 Annual Averages

Ignition Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Part failure, leak or break	1,980	(23.4%)	0	(4.7%)	22	(23.1%)	$22.4	(25.9%)
Short circuit or ground fault	1,480	(17.5%)	0	(5.3%)	10	(10.9%)	$13.1	(15.2%)
Unclassified or unknown-type mechanical failure or malfunction	750	(8.9%)	0	(0.0%)	7	(7.7%)	$9.4	(10.9%)
Electrical failure other than short circuit or ground fault	540	(6.4%)	1	(10.5%)	3	(2.9%)	$6.6	(7.7%)
Combustible too close to heat	450	(5.4%)	1	(14.5%)	2	(2.2%)	$3.1	(3.6%)
Lack of maintenance	440	(5.2%)	0	(0.0%)	2	(1.8%)	$4.5	(5.2%)
Backfire	390	(4.6%)	0	(0.0%)	5	(5.4%)	$1.4	(1.7%)
Incendiary or suspicious	390	(4.6%)	0	(4.7%)	1	(1.5%)	$5.1	(5.9%)
Fuel spilled or unintentionally released	350	(4.2%)	2	(18.0%)	15	(15.6%)	$1.3	(1.6%)
Property too close	220	(2.6%)	0	(0.0%)	0	(0.5%)	$2.3	(2.7%)
Cutting or welding too close	210	(2.5%)	0	(0.0%)	1	(1.2%)	$2.4	(2.8%)
Unclassified or unknown-type operational deficiency	190	(2.3%)	0	(0.0%)	1	(1.0%)	$3.4	(3.9%)
Unclassified ignition factor	190	(2.2%)	0	(0.0%)	1	(0.7%)	$3.0	(3.5%)
Spontaneous heating	160	(1.8%)	0	(0.0%)	0	(0.5%)	$1.3	(1.5%)
Collision, overturn or knock down	100	(1.1%)	3	(30.4%)	8	(8.2%)	$2.2	(2.5%)
Improper fueling technique	90	(1.1%)	0	(0.0%)	9	(9.6%)	$0.2	(0.2%)
Other known ignition factor	520	(6.2%)	1	(12.0%)	7	(7.3%)	$4.5	(5.3%)
Total	8,450	(100.0%)	9	(100.0%)	94	(100.0%)	$86.5	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Table 23A.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem, by Factor Contributing to Ignition Grouping

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Mechanical failure or malfunction	**4,240**	**(45.6%)**	**3**	**(16.7%)**	**27**	**(40.0%)**	**$50.1**	**(47.4%)**
Leak or break	2,310	(24.9%)	0	(0.0%)	16	(24.0%)	$32.4	(30.6%)
Worn out	480	(5.2%)	3	(16.7%)	0	(0.0%)	$2.8	(2.6%)
Backfire	290	(3.2%)	0	(0.0%)	3	(4.0%)	$1.7	(1.6%)
Unclassified or unknown-type mechanical failure or malfunction	1,120	(12.0%)	0	(0.0%)	8	(12.0%)	$13.1	(12.4%)
Electrical failure or malfunction*	**2,960**	**(31.8%)**	**8**	**(50.0%)**	**8**	**(12.0%)**	**$33.8**	**(32.0%)**
Unspecified short circuit arc*	1,560	(16.8%)	0	(0.0%)	3	(4.0%)	$16.0	(15.2%)
Unclassified or unknown-type electrical failure or malfunction	600	(6.4%)	0	(0.0%)	0	(0.0%)	$7.1	(6.7%)
Short circuit arc from defective or worn insulation	380	(4.1%)	0	(0.0%)	0	(0.0%)	$3.1	(2.9%)
Short circuit arc from mechanical damage*	210	(2.2%)	0	(0.0%)	5	(8.0%)	$2.3	(2.1%)
Arc or spark from operating equipment*	130	(1.4%)	0	(0.0%)	0	(0.0%)	$1.5	(1.4%)
Misuse of material or product	**1,100**	**(11.9%)**	**5**	**(33.3%)**	**25**	**(36.0%)**	**$8.3**	**(7.9%)**
Heat source too close to combustible	560	(6.0%)	0	(0.0%)	3	(4.0%)	$5.0	(4.7%)
Flammable liquid or gas spilled	200	(2.2%)	3	(16.7%)	8	(12.0%)	$0.8	(0.7%)
Cutting or welding too close	190	(2.0%)	0	(0.0%)	0	(0.0%)	$1.1	(1.0%)
Operational deficiency	**690**	**(7.4%)**	**8**	**(50.0%)**	**11**	**(16.0%)**	**$4.5**	**(4.3%)**
Overloaded equipment	190	(2.0%)	0	(0.0%)	0	(0.0%)	$1.0	(1.0%)
Collision, knock down or overturn	90	(1.0%)	8	(50.0%)	8	(12.0%)	$1.0	(1.0%)
Unclassified or unknown-type operational deficiency	270	(2.9%)	0	(0.0%)	3	(4.0%)	$1.8	(1.7%)
Fire spread or control	**340**	**(3.6%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$6.4**	**(6.0%)**
Exposure to other fire	230	(2.5%)	0	(0.0%)	0	(0.0%)	$3.7	(3.5%)
Natural condition	**280**	**(3.0%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$2.1**	**(2.0%)**
Unclassified or unknown-type natural condition	270	(2.9%)	0	(0.0%)	0	(0.0%)	$1.8	(1.7%)
Design, manufacturing or installation deficiency	**90**	**(1.0%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.9**	**(0.8%)**
Unclassified factor contributed	**250**	**(2.7%)**	**0**	**(0.0%)**	**3**	**(4.0%)**	**$3.6**	**(3.4%)**
None	**240**	**(2.6%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$2.6**	**(2.5%)**
Not reported (Captured under Broad Cause or Human Factor)	**560**	**(6.0%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$8.1**	**(7.6%)**
Total	**9,300**	**(100.0%)**	**15**	**(100.0%)**	**69**	**(100.0%)**	**$105.6**	**(100.0%)**

* Conversion rules for data originally collected in Version 4.1 of NFIRS make double-counting common.
Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors, or because in Version 5.0 of NFIRS, more than one factor contributing to ignition could be entered. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Unknowns have been allocated proportionally.
Source: NFIRS and NFPA survey.

Table 23B.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem, by Ignition Factor Grouping
1994-1998 Annual Averages

Ignition Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Mechanical or electrical failure	**5,600**	**(66.3%)**	**2**	**(20.4%)**	**49**	**(51.8%)**	**$57.6**	**(66.6%)**
Part failure, leak or break	1,980	(23.4%)	0	(4.7%)	22	(23.1%)	$22.4	(25.9%)
Short circuit or ground fault	1,480	(17.5%)	0	(5.3%)	10	(10.9%)	$13.1	(15.2%)
Electrical failure other than short circuit or ground fault	540	(6.4%)	1	(10.5%)	3	(2.9%)	$6.6	(7.7%)
Lack of maintenance	440	(5.2%)	0	(0.0%)	2	(1.8%)	$4.5	(5.2%)
Backfire	390	(4.6%)	0	(0.0%)	5	(5.4%)	$1.4	(1.7%)
Unclassified or unknown-type mechanical failure or malfunction	750	(8.9%)	0	(0.0%)	7	(7.7%)	$9.4	(10.9%)
Misuse of material ignited	**950**	**(11.2%)**	**3**	**(36.5%)**	**27**	**(28.8%)**	**$5.4**	**(6.2%)**
Combustible too close to heat	450	(5.4%)	1	(14.5%)	2	(2.2%)	$3.1	(3.6%)
Fuel spilled or unintentionally released	350	(4.2%)	2	(18.0%)	15	(15.6%)	$1.3	(1.6%)
Improper fueling technique	90	(1.1%)	0	(0.0%)	9	(9.6%)	$0.2	(0.2%)
Operational deficiency	**560**	**(6.7%)**	**3**	**(34.4%)**	**11**	**(12.1%)**	**$7.6**	**(8.8%)**
Spontaneous heating	160	(1.8%)	0	(0.0%)	0	(0.5%)	$1.3	(1.5%)
Collision, overturn or knock down	100	(1.1%)	3	(30.4%)	8	(8.2%)	$2.2	(2.5%)
Unclassified or unknown-type operational deficiency	190	(2.3%)	0	(0.0%)	1	(1.0%)	$3.4	(3.9%)
Incendiary or suspicious	**390**	**(4.6%)**	**0**	**(4.7%)**	**1**	**(1.5%)**	**$5.1**	**(5.9%)**
Misuse of heat	**390**	**(4.6%)**	**0**	**(4.0%)**	**3**	**(3.2%)**	**$3.1**	**(3.6%)**
Cutting or welding too close	210	(2.5%)	0	(0.0%)	1	(1.2%)	$2.4	(2.8%)
Design, construction or installation deficiency	**300**	**(3.5%)**	**0**	**(0.0%)**	**2**	**(1.8%)**	**$4.1**	**(4.8%)**
Property too close	220	(2.6%)	0	(0.0%)	0	(0.5%)	$2.3	(2.7%)
Natural condition	**30**	**(0.3%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.2**	**(0.2%)**
Other ignition factor	**240**	**(2.8%)**	**0**	**(0.0%)**	**1**	**(0.7%)**	**$3.4**	**(3.9%)**
Unclassified ignition factor	190	(2.2%)	0	(0.0%)	1	(0.7%)	$3.0	(3.5%)
Total	**8,450**	**(100.0%)**	**9**	**(100.0%)**	**94**	**(100.0%)**	**$86.5**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Table 24A.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Area of Fire Origin

Area of Fire Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine area, running gear or wheel area	5,670	(61.0%)	7	(44.4%)	34	(50.0%)	$67.7	(64.1%)
Unclassified vehicle area	770	(8.2%)	0	(0.0%)	0	(0.0%)	$7.2	(6.8%)
Open outside area, including farmland and fields	690	(7.4%)	0	(0.0%)	0	(0.0%)	$9.6	(9.1%)
Separate operator or control area	450	(4.8%)	5	(33.3%)	0	(0.0%)	$6.2	(5.9%)
Exterior, exposed vehicle surface	380	(4.1%)	2	(11.1%)	3	(3.8%)	$2.6	(2.4%)
Fuel tank or fuel line	320	(3.5%)	2	(11.1%)	13	(19.2%)	$5.4	(5.1%)
Operator and passenger area (combination area)	230	(2.4%)	0	(0.0%)	5	(7.7%)	$2.4	(2.3%)
Unclassified area of origin	220	(2.4%)	0	(0.0%)	3	(3.8%)	$1.6	(1.5%)
Cargo or trunk area	210	(2.3%)	0	(0.0%)	3	(3.8%)	$1.0	(0.9%)
Other known area	360	(3.9%)	0	(0.0%)	8	(11.5%)	$2.1	(2.0%)
Total	9,300	(100.0%)	15	(100.0%)	69	(100.0%)	$105.6	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the area or origin was unknown or not reported were allocated proportionally among fires with known area of origin.

Source: NFIRS and NFPA survey.

Table 24B.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Area of Fire Origin 1994-1998 Annual Averages

Area of Fire Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine, running gear or wheel area of vehicle	5,280	(62.5%)	3	(33.3%)	54	(57.8%)	$53.0	(61.3%)
Lawn, field or open area	490	(5.9%)	0	(20.2%)	9	(9.3%)	$4.6	(5.4%)
Unclassified vehicle area	440	(5.2%)	0	(3.7%)	5	(5.1%)	$4.1	(4.7%)
Separate operating or control area of vehicle	400	(4.7%)	0	(8.6%)	2	(2.2%)	$4.6	(5.4%)
Fuel tank or fuel line of vehicle	350	(4.2%)	0	(9.1%)	6	(6.4%)	$2.6	(3.0%)
Exterior surface of vehicle	320	(3.7%)	0	(16.6%)	3	(3.1%)	$4.1	(4.7%)
Passenger area of vehicle	280	(3.3%)	0	(8.5%)	1	(1.1%)	$3.3	(3.8%)
Cargo or trunk area of vehicle	210	(2.5%)	0	(0.0%)	2	(2.2%)	$1.4	(1.6%)
Unclassified area of origin	200	(2.4%)	0	(0.0%)	1	(1.1%)	$2.8	(3.2%)
Other known area	470	(5.6%)	0	(0.0%)	11	(11.6%)	$5.9	(6.8%)
Total	8,450	(100.0%)	9	(100.0%)	94	(100.0%)	$86.5	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the area or origin was unknown or not reported were allocated proportionally among fires with known area of origin.

Source: NFIRS and NFPA survey.

Table 25A.
1999 U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Item First Ignited

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Agricultural crop including fruits and vegetables	1,680	(18.1%)	0	(0.0%)	5	(8.0%)	$15.1	(14.3%)
Flammable liquid or gas in or from final container	1,620	(17.5%)	10	(66.7%)	22	(32.0%)	$15.4	(14.6%)
Electrical wire or cable insulation	1,530	(16.5%)	0	(0.0%)	3	(4.0%)	$19.2	(18.2%)
Unclassified item first ignited	1,240	(13.3%)	5	(33.3%)	3	(4.0%)	$19.4	(18.4%)
Multiple items first ignited	550	(5.9%)	0	(0.0%)	3	(4.0%)	$6.7	(6.3%)
Grass or light vegetation excluding crops	530	(5.7%)	0	(0.0%)	3	(4.0%)	$3.4	(3.2%)
Dust, fiber or lint including sawdust and excelsior	400	(4.3%)	0	(0.0%)	0	(0.0%)	$3.9	(3.7%)
Rubbish, trash or waste	380	(4.1%)	0	(0.0%)	0	(0.0%)	$2.6	(2.5%)
Flammable liquid or gas in container or pipe	300	(3.2%)	0	(0.0%)	19	(28.0%)	$4.5	(4.3%)
Tire	290	(3.1%)	0	(0.0%)	5	(8.0%)	$2.1	(2.0%)
Conveyor belt, drive belt or V-belt	160	(1.7%)	0	(0.0%)	0	(0.0%)	$3.2	(3.0%)
Other known item	600	(6.5%)	0	(0.0%)	5	(8.0%)	$10.0	(9.5%)
Total	9,300	(100.0%)	15	(100.0%)	69	(100.0%)	$105.6	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the item first ignited was unknown or not reported were allocated proportionally among fires with known item first ignited.

Source: NFIRS and NFPA survey.

Table 25B.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem
by Form of Material First Ignited
1994-1998 Annual Averages

Form of Material	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Fuel	2,120	(25.1%)	4	(45.0%)	42	(45.1%)	$20.0	(23.1%)
Electrical wire or cable insulation	1,550	(18.4%)	0	(5.0%)	11	(11.2%)	$11.7	(13.5%)
Agricultural product	860	(10.1%)	1	(7.6%)	2	(2.0%)	$10.5	(12.1%)
Unclassified form of material*	840	(9.9%)	0	(3.8%)	6	(6.1%)	$11.0	(12.8%)
Multiple forms of material	500	(5.9%)	0	(5.0%)	2	(1.7%)	$8.6	(10.0%)
Growing or living form	460	(5.5%)	0	(4.5%)	4	(4.6%)	$2.6	(3.1%)
Accelerant or gas or liquid in or from pipe or container	390	(4.6%)	2	(25.3%)	14	(15.4%)	$5.1	(5.9%)
Unclassified or unknown-type power transfer equipment or fuel	330	(3.9%)	0	(0.0%)	4	(4.1%)	$4.5	(5.2%)
Tire	270	(3.2%)	0	(0.0%)	2	(2.2%)	$3.0	(3.5%)
Rubbish, trash or waste	260	(3.1%)	0	(0.0%)	2	(1.7%)	$1.9	(2.2%)
Dust, fiber or lint	170	(2.1%)	0	(0.0%)	0	(0.0%)	$1.5	(1.7%)
Upholstered furniture	110	(1.3%)	0	(0.0%)	0	(0.5%)	$0.9	(1.1%)
Conveyor belt, drive belt or V-belt	80	(1.0%)	0	(0.0%)	0	(0.0%)	$0.8	(1.0%)
Other known form	500	(5.9%)	0	(3.8%)	5	(5.4%)	$4.2	(4.9%)
Total	8,450	(100.0%)	9	(100.0%)	94	(100.0%)	$86.5	(100.0%)

* Unclassified or unknown-type other form includes code 99, "Unclassified form of material," and code 90, an unassigned code in the "Other form of material" category.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the form of material first ignited was unknown or not reported were allocated proportionally among fires with known form of material first ignited.

Source: NFIRS and NFPA survey.

Table 26.
U.S. Heavy Industrial, Agricultural, Construction, Special and Miscellaneous Vehicle Fire Problem by Type of Material First Ignited 1994-1998 Annual Averages

Type of Material	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible liquid	**2,700**	**(31.9%)**	**5**	**(57.4%)**	**52**	**(55.0%)**	**$29.3**	**(33.9%)**
Gasoline	1,450	(17.2%)	3	(36.1%)	34	(36.6%)	$5.6	(6.5%)
Class II combustible liquid	500	(6.0%)	0	(4.3%)	5	(5.3%)	$10.2	(11.8%)
Class IIIB combustible liquid	320	(3.8%)	0	(3.7%)	4	(4.5%)	$4.6	(5.3%)
Unclassified or unknown-type flammable or combustible liquid	300	(3.6%)	0	(4.8%)	6	(6.0%)	$6.6	(7.7%)
Natural product	**2,220**	**(26.2%)**	**1**	**(11.6%)**	**11**	**(11.5%)**	**$18.8**	**(21.8%)**
Grass, leaves, hay or straw	1,110	(13.1%)	1	(7.3%)	5	(5.5%)	$7.6	(8.8%)
Rubber	620	(7.4%)	0	(0.0%)	6	(6.0%)	$5.9	(6.8%)
Grain or natural fiber	370	(4.4%)	0	(4.3%)	0	(0.0%)	$4.0	(4.6%)
Unclassified or unknown-type natural product	100	(1.2%)	0	(0.0%)	0	(0.0%)	$1.0	(1.2%)
Plastic	**1,190**	**(14.0%)**	**0**	**(0.0%)**	**10**	**(10.5%)**	**$10.1**	**(11.7%)**
Polyvinyl	350	(4.2%)	0	(0.0%)	4	(4.1%)	$3.2	(3.7%)
Unclassified or unknown-type plastic	720	(8.5%)	0	(0.0%)	6	(6.5%)	$6.2	(7.2%)
Volatile solid or chemical	**430**	**(5.1%)**	**0**	**(0.0%)**	**2**	**(1.7%)**	**$3.0**	**(3.5%)**
Grease (nonfood)	310	(3.6%)	0	(0.0%)	1	(1.0%)	$2.3	(2.7%)
Gas	**290**	**(3.4%)**	**2**	**(22.5%)**	**13**	**(14.4%)**	**$1.6**	**(1.9%)**
Unclassified or unknown-type gas	130	(1.6%)	0	(4.8%)	4	(4.1%)	$0.6	(0.6%)
Wood or paper	**270**	**(3.1%)**	**0**	**(3.7%)**	**1**	**(1.2%)**	**$3.8**	**(4.4%)**
Material compounded with oil	**200**	**(2.3%)**	**0**	**(0.0%)**	**2**	**(1.9%)**	**$3.5**	**(4.0%)**
Unclassified or unknown-type material compounded with oil	140	(1.6%)	0	(0.0%)	1	(0.7%)	$3.3	(3.8%)
Fabric, textile or fur	**140**	**(1.7%)**	**0**	**(0.0%)**	**1**	**(0.7%)**	**$1.2**	**(1.4%)**
Other type of material	**1,030**	**(12.2%)**	**0**	**(4.8%)**	**3**	**(3.1%)**	**$15.1**	**(17.5%)**
Unclassified	510	(6.0%)	0	(0.0%)	1	(1.0%)	$5.8	(6.7%)
Multiple types of material ignited	480	(5.6%)	0	(4.8%)	2	(2.2%)	$9.0	(10.4%)
Not applicable	40	(0.5%)	0	(0.0%)	0	(0.0%)	$0.3	(0.4%)
Total	**8,450**	**(100.0%)**	**9**	**(100.0%)**	**94**	**(100.0%)**	**$86.5**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the type of material first ignited was unknown or not reported were allocated proportionally among fires with known type of material first ignited.

Source: NFIRS and NFPA survey.

U.S. Water Transport Vehicle Fire Problem

An estimated 1,250 water transport vehicle fires were reported in 1999.
During 1999, an estimated 1,250 water transport vehicle fires were reported to U.S. fire departments. These fires caused an estimated two civilian deaths, 71 civilian fire injuries and $20,800,000 in direct property damage. These figures reflect estimates of water transport vehicle fires reported to U.S. fire departments. They do not include fires on the open seas outside of the jurisdiction of a local fire department. Water transport vehicle fires fell 9% from 1,370 in 1998 to a record low (since 1980, the year the NFPA began tracking with current methods) of 1,250 in 1999. Since 1980, they have fallen 48%. (See Table 27.)

An estimated average of 1,540 water transport vehicle fires were reported to local fire departments per year during the period from 1994 through 1998. These fires caused an average of six civilian deaths, 73 civilian injuries, and $20,900,000 in direct property damage annually during that time.

Water transport vehicle fires caused a disproportionate share of the vehicle fire losses.
In 1999, water transport vehicles accounted for 0.3% of the 369,090 reported vehicle fires, 0.4% of the 469 vehicle fire deaths, 3.9% of the 1,846 civilian injuries, and 1.6% of the $1,323,200,000 in direct property damage.

During 1994-1998, these vehicle fires accounted for an average of 0.4% of the 399,940 motor vehicle fires, 1.0% of the 586 vehicle fire deaths, 3.1% of the 2,346 vehicle fire injuries and 1.7% of the $1,240,700,000 in direct vehicle property damage caused by vehicle fires per year.

Table 28 shows that motor craft vessels under 65 feet in length were involved in 70-76% of the water transport vehicle fires. This table also shows the loss estimates for other types of water transport vessels.

Water transport vehicle fires were more common in summer and on weekends.
Tables 29, 30 and 31 show the patterns of water transport vehicle fires by month, day and time of day. July was the peak month for these incidents. June ranked second and August was third. These fires were much less common from November through February. The fewest water transport vehicle fires occurred in December.

Table 30 shows that there was less consistency for fires by day of week, although fires tended to be more common on weekends and less common from Monday through Thursday in both 1999 and 1994-1998. Water transport vehicle fires were more common in the afternoon and evening. They peaked between 3:00 and 6:00 p.m. with the period from noon to 3:00 p.m. ranking second. The period from 6:00 to 9:00 p.m. ranked third.

Water transport vehicle fires occurred on or in a variety of properties.
Many water transport vehicle fires occurred in places other than water properties. Table 32 shows that roughly one-quarter of these vehicle fires began in or on some sort of water property, 12-14% started on a road, driveway or path, and 10-11% occurred at one- or two-family dwellings. As previously mentioned, these statistics reflect fires reported to public fire departments only. Fires outside of their jurisdictions are not included.

The leading cause of these fires was mechanical or electrical failure.
The causes of water transport vessel fires are shown in Tables 33 and 34. In 1999, a failure of equipment or heat source caused 48% of these fires. Mechanical or electrical factors were cited as the cause in 35% of the 1994-1998 fires. Twenty-two to twenty-five percent were intentionally set.

Table 35 shows that 26-30% of the fires in water transport vessels began in the engine, running gear, or wheel area; 15-19% of the fires began in the passenger area, and 10-13% began on an exterior, exposed surface of the vessel. Although the numbers are small, it is worth noting that 2-3% of the fires began in kitchens and 1-2% began in bedrooms. Activities in these rooms afloat probably resemble activities in these rooms on land.

Little change was seen in leading items first ignited.
Table 36 shows the items or forms of material first ignited in water transport vehicle fires. The leading items were consistent in both periods, although the definitions varied somewhat. Fuel or a flammable liquid or gas in or from the final container ranked first; an unclassified item or form was second; electrical wire or cable insulation tied for second in 1999 and ranked third in 1994-1998; and multiple items first ignited held the fourth position in both periods.

Plastics or flammable or combustible liquids were first ignited in over half of the water transport vehicle fires.
Due to changes in the coding rules for Version 5.0 of NFIRS, the type of material first ignited is shown for the 1994-1998 period only. Table 37 shows the types of material first ignited in water transport vehicle fires. Two groups of materials were ignited first in more than half of the incidents: plastics (28%) and flammable or combustible liquids (26%). Gasoline was the specific type of material first ignited in 20% of the fires. These gasoline fires caused 58% of the injuries.

***Fire Protection Handbook's* chapter "Marine Vessels" has more information.**
The chapter "Marine Vessels," revised by Randal Eberly in the nineteenth edition of the *NFPA Fire Protection Handbook,* provides information on fire prevention and protection in pleasure and small commercial boats as well as ships. A bibliography is included.

Reports of the U.S. National Transportation Safety Board's (NTSB's) recent investigations into marine accidents, including fires, are available on-line at http://www.ntsb.gov/Publictn/M_Acc.htm. In the United Kingdom, the Marine Accident Investigative Branch (MAIB) publishes several editions of *Safety Digest: Lessons from Marine Accident Reports* each year. These reports are available on-line at http://www.dft.gov.uk/.

Table 27.
U.S. Water Transport Vehicle Fire Problem, by Year: 1980-1998

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)	Loss in 1999 dollars
1980	2,430	8	157	$18.8	$38.0
1981	2,500	9	182	$15.5	$28.3
1982	2,260	7	154	$61.8	$106.7
1983	2,260	11	215	$27.4	$45.8
1984	2,360	9	168	$27.9	$44.7
1985	2,250	7	174	$10.5	$16.2
1986	2,390	6	245	$11.9	$18.2
1987	2,420	9	155	$17.6	$25.8
1988	2,640	10	187	$27.7	$39.1
1989	2,170	10	99	$41.1	$55.3
1990	2,280	14	123	$37.5	$47.8
1991	2,150	7	118	$25.9	$31.7
1992	1,820	4	127	$24.6	$29.2
1993	1,710	10	71	$20.3	$23.4
1994	1,620	11	81	$21.9	$24.6
1995	1,710	3	67	$22.7	$24.8
1996	1,470	13	58	$31.4	$33.4
1997	1,530	4	82	$17.7	$18.3
1998	1,370	0	78	$10.7	$11.0
1980-1998 Annual average	2,070	8	134	$24.9	$34.9
1994-1998 Annual average	1,540	6	73	$20.9	$22.4
1999*	1,250	2	71	$20.8	$20.8

* NFIRS data for 1999 was received in the Version 5.0 format and involves enough coding changes that it can better be analyzed separately from data from previous years.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation.

Source: NFIRS and NFPA survey, "Purchasing Power of the Dollar" custom table from Bureau of Labor Statistics at http://www.bls.gov/cpi/.

Table 28A.
1999 U.S. Water Transport Vehicle Fire Problem, by Type of Vehicle

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Motor craft under 65 feet in length	870	(69.8%)	2	(100.0%)	57	(80.0%)	$11.7	(56.1%)
Commercial fishing or processing vessel	60	(5.2%)	0	(0.0%)	9	(13.3%)	$5.0	(23.9%)
Sailboat	50	(3.6%)	0	(0.0%)	2	(3.3%)	$0.3	(1.3%)
Barge, petroleum balloon or towable water vessel	30	(2.7%)	0	(0.0%)	0	(0.0%)	$1.2	(5.7%)
Vessel over 65 feet, but under 1,000 gross tons	30	(2.3%)	0	(0.0%)	0	(0.0%)	$0.8	(3.8%)
Tank ship	10	(1.1%)	0	(0.0%)	0	(0.0%)	$0.0	(0.2%)
Personal water craft	10	(1.1%)	0	(0.0%)	2	(3.3%)	$0.0	(0.1%)
Cargo or military ship of at least 1,000 tons	10	(0.5%)	0	(0.0%)	0	(0.0%)	$1.4	(6.6%)
Unclassified or unknown-type water transport vehicle	170	(13.7%)	0	(0.0%)	0	(0.0%)	$0.5	(2.2%)
Total	1,250	(100.0%)	2	(100.0%)	71	(100.0%)	$20.8	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 28B.
U.S. Water Transport Vehicle Fire Problem, by Type of Vehicle
1994-1998 Annual Averages

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Motor craft under 65 feet in length	1,170	(75.9%)	2	(33.3%)	61	(82.8%)	$10.2	(48.9%)
Commercial fishing vessel	70	(4.5%)	2	(26.7%)	3	(4.6%)	$2.9	(13.7%)
Vessel over 65 feet, but under 1,000 gross tons	40	(2.6%)	0	(0.0%)	0	(0.5%)	$4.2	(20.0%)
Non self-propelled vessel	30	(1.6%)	1	(10.0%)	0	(0.5%)	$0.0	(0.2%)
Tank ship	10	(0.6%)	0	(0.0%)	0	(0.5%)	$0.0	(0.1%)
Cargo ship	10	(0.6%)	0	(0.0%)	1	(1.6%)	$0.1	(0.5%)
Passenger ship	10	(0.5%)	2	(30.0%)	2	(3.0%)	$0.0	(0.2%)
Combat ship	0	(0.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Unclassified or unknown-type water transport vehicle	210	(13.5%)	0	(0.0%)	5	(6.3%)	$3.4	(16.3%)
Total	1,540	(100.0%)	6	(100.0%)	73	(100.0%)	$20.9	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 29A.
1999 U.S. Water Transport Vehicle Fires, by Month

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	70	(5.9%)	0	(0.0%)	0	(0.0%)	$2.4	(11.4%)
February	50	(4.3%)	0	(0.0%)	0	(0.0%)	$2.9	(14.0%)
March	80	(6.3%)	0	(0.0%)	7	(10.0%)	$1.0	(4.7%)
April	100	(7.7%)	0	(0.0%)	0	(0.0%)	$1.5	(7.4%)
May	100	(7.7%)	0	(0.0%)	0	(0.0%)	$0.8	(3.7%)
June	160	(13.1%)	2	(100.0%)	2	(3.3%)	$1.3	(6.1%)
July	220	(17.6%)	0	(0.0%)	7	(10.0%)	$1.3	(6.4%)
August	150	(11.9%)	0	(0.0%)	47	(66.7%)	$1.1	(5.2%)
September	110	(8.8%)	0	(0.0%)	2	(3.3%)	$3.9	(18.8%)
October	110	(8.6%)	0	(0.0%)	5	(6.7%)	$3.9	(18.8%)
November	50	(4.3%)	0	(0.0%)	0	(0.0%)	$0.2	(1.2%)
December	50	(4.1%)	0	(0.0%)	0	(0.0%)	$0.5	(2.4%)
Total	1,250	(100.0%)	2	(100.0%)	71	(100.0%)	$20.8	(100.0%)
Monthly average	100	(8.3%)	0	(8.3%)	6	(8.3%)	$1.7	(8.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 29B.
U.S. Water Transport Vehicle Fires, by Month
1994-1998 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	80	(5.3%)	0	(0.0%)	5	(6.5%)	$0.7	(3.4%)
February	80	(5.1%)	0	(0.0%)	4	(5.2%)	$1.9	(9.2%)
March	100	(6.3%)	0	(0.0%)	3	(3.5%)	$0.9	(4.5%)
April	110	(7.3%)	0	(0.0%)	4	(5.7%)	$3.3	(16.0%)
May	170	(10.8%)	1	(22.6%)	10	(13.0%)	$2.8	(13.2%)
June	200	(12.9%)	0	(6.5%)	11	(14.7%)	$1.8	(8.7%)
July	220	(14.5%)	3	(45.2%)	18	(24.5%)	$2.0	(9.5%)
August	170	(11.3%)	1	(9.7%)	7	(10.1%)	$1.8	(8.8%)
September	120	(8.1%)	0	(0.0%)	2	(3.0%)	$1.1	(5.1%)
October	130	(8.2%)	0	(0.0%)	5	(6.8%)	$1.3	(6.0%)
November	80	(5.3%)	0	(6.5%)	5	(6.3%)	$2.4	(11.3%)
December	80	(5.0%)	1	(9.7%)	1	(0.8%)	$0.9	(4.2%)
Total	1,540	(100.0%)	6	(100.0%)	73	(100.0%)	$20.9	(100.0%)
Monthly average	130	(8.3%)	1	(8.3%)	6	(8.3%)	$1.7	(8.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 30A.
1999 U.S. Water Transport Vehicle Fires, by Day of Week

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	250	(19.8%)	2	(100.0%)	7	(10.0%)	$3.3	(15.9%)
Monday	180	(14.2%)	0	(0.0%)	5	(6.7%)	$3.8	(18.4%)
Tuesday	140	(11.3%)	0	(0.0%)	2	(3.3%)	$2.9	(13.9%)
Wednesday	160	(12.6%)	0	(0.0%)	2	(3.3%)	$2.0	(9.5%)
Thursday	140	(11.5%)	0	(0.0%)	5	(6.7%)	$4.0	(19.1%)
Friday	200	(16.0%)	0	(0.0%)	5	(6.7%)	$2.4	(11.5%)
Saturday	180	(14.6%)	0	(0.0%)	45	(63.3%)	$2.4	(11.6%)
Total	1,250	(100.0%)	2	(100.0%)	71	(100.0%)	$20.8	(100.0%)
Daily average	180	(14.3%)	0	(14.3%)	10	(14.3%)	$3.0	(14.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the day of week was unknown or not reported have been allocated proportionally among fires with known day of week.

Source: NFIRS and NFPA survey.

Table 30B.
U.S. Water Transport Vehicle Fires, by Day of Week
1994-1998 Annual Averages

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	260	(16.8%)	0	(5.0%)	16	(21.4%)	$2.7	(13.0%)
Monday	190	(12.3%)	0	(0.0%)	8	(11.1%)	$1.6	(7.6%)
Tuesday	210	(13.4%)	1	(21.3%)	7	(9.3%)	$2.2	(10.5%)
Wednesday	190	(12.6%)	0	(6.0%)	5	(6.9%)	$2.5	(12.0%)
Thursday	200	(12.9%)	0	(0.0%)	5	(6.9%)	$2.0	(9.7%)
Friday	210	(13.4%)	1	(22.2%)	10	(13.8%)	$5.7	(27.3%)
Saturday	290	(18.7%)	3	(45.4%)	22	(30.6%)	$4.2	(19.9%)
Total	1,540	(100.0%)	6	(100.0%)	73	(100.0%)	$20.9	(100.0%)
Daily average	220	(14.3%)	1	(14.3%)	10	(14.3%)	$3.0	(14.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages Fires in which the day of week was unknown or not reported have been allocated proportionally among fires with known day of week.

Source: NFIRS and NFPA survey.

Table 31A.
1999 U.S. Water Transport Vehicle Fires, by Time of Day

Time of Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
12:01 - 3:00 a.m.	170	(13.3%)	2	(100.0%)	7	(10.0%)	$3.9	(18.5%)
3:01 - 6:00 a.m.	80	(6.8%)	0	(0.0%)	5	(6.7%)	$0.8	(3.7%)
6:01 - 9:00 a.m.	90	(7.4%)	0	(0.0%)	5	(6.7%)	$4.0	(19.4%)
9:01 - Noon	130	(10.1%)	0	(0.0%)	40	(56.7%)	$2.7	(13.1%)
12:01 - 3:00 p.m.	220	(17.3%)	0	(0.0%)	5	(6.7%)	$1.6	(7.6%)
3:01 - 6:00 p.m.	240	(19.4%)	0	(0.0%)	5	(6.7%)	$2.2	(10.6%)
6:01 - 9:00 p.m.	190	(14.9%)	0	(0.0%)	2	(3.3%)	$2.6	(12.6%)
9:01 - Midnight	140	(10.8%)	0	(0.0%)	2	(3.3%)	$3.0	(14.4%)
Total	1,250	(100.0%)	2	(100.0%)	71	(100.0%)	$20.8	(100.0%)
Average	160	(12.5%)	0	(12.5%)	9	(12.5%)	$2.6	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 31B.
U.S. Water Transport Vehicle Fires, by Time of Day
1994-1998 Annual Averages

Time of Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
12:01 - 3:00 a.m.	160	(10.7%)	0	(6.1%)	3	(4.3%)	$3.6	(17.2%)
3:01 - 6:00 a.m.	120	(7.9%)	0	(6.1%)	2	(3.0%)	$3.9	(18.9%)
6:01 - 9:00 a.m.	100	(6.4%)	3	(48.5%)	4	(5.7%)	$0.8	(4.0%)
9:01 - Noon	160	(10.3%)	1	(12.1%)	11	(15.2%)	$2.0	(9.8%)
12:01 - 3:00 p.m.	260	(16.9%)	0	(6.1%)	21	(29.0%)	$2.0	(9.6%)
3:01 - 6:00 p.m.	270	(17.2%)	1	(15.2%)	20	(27.6%)	$3.7	(17.9%)
6:01 - 9:00 p.m.	240	(15.7%)	0	(0.0%)	7	(9.2%)	$2.2	(10.5%)
9:01 - Midnight	230	(14.8%)	0	(6.1%)	4	(6.0%)	$2.6	(12.2%)
Total	1,540	(100.0%)	6	(100.0%)	73	(100.0%)	$20.9	(100.0%)
Average	190	(12.5%)	1	(12.5%)	9	(12.5%)	$2.6	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 32A.
1999 U.S. Water Transport Vehicle Fires, by Fixed Property Use

Fixed Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified or unknown-type water area	160	(13.1%)	2	(100.0%)	14	(20.0%)	$4.5	(21.4%)
Residential street, road or residential driveway	150	(11.7%)	0	(0.0%)	0	(0.0%)	$0.9	(4.4%)
Lake, river or stream	130	(10.6%)	0	(0.0%)	2	(3.3%)	$0.8	(3.8%)
One- or two-family dwelling	130	(10.4%)	0	(0.0%)	0	(0.0%)	$0.5	(2.5%)
Vehicle parking area	100	(7.7%)	0	(0.0%)	0	(0.0%)	$0.5	(2.3%)
Dock, marina, pier, wharf	90	(7.4%)	0	(0.0%)	38	(53.3%)	$1.5	(7.2%)
Unclassified or unknown-type outside or special property	60	(4.7%)	0	(0.0%)	0	(0.0%)	$0.2	(1.1%)
Motor vehicle or boat sales, service or repair	50	(4.3%)	0	(0.0%)	2	(3.3%)	$1.6	(7.5%)
Open land or field	50	(4.3%)	0	(0.0%)	0	(0.0%)	$0.2	(0.7%)
Open ocean, sea or tidal water	50	(3.8%)	0	(0.0%)	2	(3.3%)	$3.3	(16.0%)
Unclassified or unknown-type vehicle storage	30	(2.7%)	0	(0.0%)	5	(6.7%)	$0.2	(0.9%)
Highway or divided highway	30	(2.3%)	0	(0.0%)	0	(0.0%)	$0.2	(0.7%)
Service station or gas station	10	(1.1%)	0	(0.0%)	5	(6.7%)	$0.4	(1.8%)
Unclassified or unknown-type road or parking property	10	(1.1%)	0	(0.0%)	0	(0.0%)	$0.0	(0.2%)
Other known property use	10	(0.9%)	0	(0.0%)	0	(0.0%)	$0.4	(1.7%)
Unclassified or unknown-type property use	100	(8.1%)	0	(0.0%)	2	(3.3%)	$4.7	(22.5%)
Total	1,250	(100.0%)	2	(100.0%)	71	(100.0%)	$20.8	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 32B.
U.S. Water Transport Vehicle Fires, by Fixed Property Use
1994-1998 Annual Averages

Fixed Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
One- or two-family dwelling	170	(10.8%)	0	(5.0%)	5	(6.4%)	$0.9	(4.1%)
Inland water area	130	(8.6%)	0	(0.0%)	10	(14.0%)	$2.5	(12.1%)
Boat or ship storage	130	(8.5%)	0	(6.0%)	7	(9.1%)	$3.0	(14.6%)
Paved public street	120	(7.7%)	0	(0.0%)	1	(1.0%)	$0.6	(2.8%)
Alongside quay, pier or pilings	110	(6.9%)	1	(15.3%)	11	(15.4%)	$2.8	(13.5%)
Open land or field	100	(6.4%)	0	(0.0%)	3	(3.9%)	$0.4	(1.9%)
Uncovered parking area	100	(6.4%)	0	(6.0%)	1	(1.8%)	$0.6	(3.0%)
Fixed property use not applicable	80	(5.0%)	1	(12.1%)	3	(4.6%)	$0.4	(2.0%)
Paved private street or way	60	(4.1%)	0	(0.0%)	1	(1.6%)	$0.3	(1.4%)
Unclassified or unknown-type water area	50	(3.1%)	0	(0.0%)	4	(6.1%)	$1.3	(6.1%)
Within port, channel or anchorage	40	(2.6%)	1	(10.2%)	2	(3.2%)	$2.9	(13.9%)
Unpaved street, road or path	40	(2.6%)	0	(0.0%)	1	(1.1%)	$0.2	(1.0%)
Unclassified or unknown-type outdoor property	40	(2.4%)	0	(0.0%)	1	(1.3%)	$0.1	(0.7%)
Limited access or divided highway	30	(1.7%)	0	(0.0%)	0	(0.6%)	$0.1	(0.5%)
Unclassified or unknown-type motor vehicle sales, repair or services	20	(1.6%)	0	(0.0%)	0	(0.0%)	$0.2	(1.1%)
Boat or pleasure craft sales facility	20	(1.4%)	0	(0.0%)	1	(0.7%)	$0.2	(1.1%)
Unclassified or unknown-type road or parking property	20	(1.3%)	0	(0.0%)	1	(1.0%)	$0.1	(0.5%)
Vacant lot	20	(1.2%)	0	(0.0%)	0	(0.0%)	$0.1	(0.5%)
In open sea or tidal waters	20	(1.1%)	2	(30.2%)	1	(1.2%)	$0.2	(1.2%)
Facility for boat building or repair of vessels under 65 feet	20	(1.0%)	0	(0.0%)	1	(1.8%)	$0.4	(2.0%)
Other known fixed property use	180	(12.3%)	1	(15.2%)	17	(23.8%)	$2.5	(12.0%)
Unclassified or unknown-type fixed property use	50	(3.3%)	0	(0.0%)	1	(1.4%)	$0.8	(4.0%)
Total	1,540	(100.0%)	6	(100.0%)	73	(100.0%)	$20.9	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 33A.
1999 U.S. Water Transport Vehicle Fires, by Factor Contributing to Ignition

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unspecified short circuit arc**	180	(14.5%)	*	(*)	0	(0.0%)	$2.8	(13.5%)
Exposure to other fire	180	(14.2%)	*	(*)	0	(0.0%)	$4.2	(20.2%)
Unclassified or unknown-type electrical failure or malfunction**	90	(7.4%)	*	(*)	0	(0.0%)	$1.7	(8.1%)
Unclassified or unknown-type mechanical failure or malfunction	80	(6.2%)	*	(*)	0	(0.0%)	$1.1	(5.4%)
Leak or break	70	(5.6%)	*	(*)	47	(66.7%)	$3.1	(15.0%)
Unclassified factor contributed to ignition	50	(3.7%)	*	(*)	3	(4.2%)	$0.5	(2.6%)
Cutting, welding too close to combustible material	50	(3.7%)	*	(*)	0	(0.0%)	$0.4	(2.1%)
Backfire	50	(3.7%)	*	(*)	0	(0.0%)	$0.3	(1.5%)
Heat source too close to combustible material	30	(2.8%)	*	(*)	0	(0.0%)	$0.0	(0.2%)
Unclassified or unknown-type misuse of material or product	30	(2.5%)	*	(*)	6	(8.3%)	$0.4	(1.9%)
Flammable liquid or gas spilled	30	(2.2%)	*	(*)	3	(4.2%)	$0.1	(0.6%)
Improper startup	30	(2.2%)	*	(*)	6	(8.3%)	$0.6	(2.7%)
Open fire	30	(2.2%)	*	(*)	0	(0.0%)	$0.2	(0.9%)
Playing with heat source	20	(1.9%)	*	(*)	0	(0.0%)	$0.2	(1.1%)
Arc or spark from operating equipment**	20	(1.9%)	*	(*)	50	(70.8%)	$0.5	(2.3%)
Abandoned or discarded materials or products	20	(1.5%)	*	(*)	0	(0.0%)	$0.0	(0.1%)
Improper fueling technique	20	(1.5%)	*	(*)	6	(8.3%)	$0.3	(1.5%)
Short circuit arc from mechanical damage**	20	(1.5%)	*	(*)	0	(0.0%)	$0.1	(0.2%)
Arc from faulty contact or broken conductor**	20	(1.2%)	*	(*)	0	(0.0%)	$0.0	(0.1%)
Installation deficiency	20	(1.2%)	*	(*)	0	(0.0%)	$2.1	(10.0%)
No contributing factor	50	(4.3%)	*	(*)	0	(0.0%)	$1.4	(6.5%)
Not reported (Captured under Broad Cause or Human Factor)	270	(21.9%)	*	(*)	3	(4.2%)	$2.3	(11.0%)
Other known factor	100	(8.0%)	*	(*)	0	(0.0%)	$0.8	(3.9%)
Total	1,250	(100.0%)	2	(100.0%)	71	(100.0%)	$20.8	(100.0%)

*The factor contributing to ignition in the fire deaths was undetermined.
** Conversion rules for data originally collected in Version 4.1 of NFIRS make double-counting common.

Table 33A.
1999 U.S. Water Transport Vehicle Fires, by Factor Contributing to Ignition
(Continued)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors, or because in Version 5.0 of NFIRS, more than one factor contributing to ignition could be entered. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the factor contributing to ignition was undetermined were allocated proportionally among fires with known factor contributing to ignition.

Source: NFIRS and NFPA survey.

Table 33B.
1999 U.S. Water Transport Vehicle Fires, by Broad Cause

Broad Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Failure of equipment or heat source	600	(47.6%)	*	(*)	46	(65.2%)	$13.6	(65.1%)
Unintentional	320	(25.8%)	*	(*)	19	(26.1%)	$3.5	(17.0%)
Intentional	280	(22.4%)	*	(*)	3	(4.3%)	$3.2	(15.4%)
Unclassified cause	40	(3.3%)	*	(*)	3	(4.3%)	$0.5	(2.3%)
Act of nature	10	(0.9%)	*	(*)	0	(0.0%)	$0.0	(0.2%)
Total	1,250	(100.0%)	2	(100.0%)	71	(100.0%)	$20.8	(100.0%)

*The broad cause of the fire deaths was undetermined.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the broad cause was under investigation, undetermined or not reported were allocated proportionally among fires with known cause.

Source: NFIRS and NFPA survey.

Table 33C.
U.S. Water Transport Vehicle Fires, by Ignition Factor
1994-1998 Annual Averages

Ignition Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Incendiary or suspicious	390	(25.1%)	0	(0.0%)	3	(4.0%)	$6.1	(29.1%)
Short circuit or ground fault	230	(14.9%)	0	(0.0%)	4	(5.2%)	$3.0	(14.5%)
Property too close to	200	(12.7%)	0	(0.0%)	0	(0.0%)	$1.9	(9.1%)
Other electrical failure	90	(6.1%)	2	(27.3%)	3	(3.9%)	$1.3	(6.1%)
Part failure, leak or break	90	(5.9%)	0	(0.0%)	6	(8.4%)	$2.7	(13.2%)
Backfire	70	(4.3%)	0	(0.0%)	4	(4.9%)	$0.6	(3.1%)
Unclassified ignition factor	50	(3.5%)	0	(0.0%)	1	(1.2%)	$0.5	(2.2%)
Fuel spilled or unintentionally released	50	(3.3%)	0	(0.0%)	12	(16.6%)	$0.3	(1.3%)
Cutting or welding too close	40	(2.9%)	1	(13.5%)	4	(4.9%)	$0.5	(2.3%)
Unclassified or unknown-type mechanical failure or malfunction	40	(2.9%)	1	(11.3%)	4	(5.8%)	$0.6	(2.9%)
Combustible too close to heat	40	(2.4%)	0	(0.0%)	3	(4.3%)	$0.4	(1.9%)
Abandoned or discarded material	30	(1.8%)	0	(0.0%)	3	(3.5%)	$0.1	(0.4%)
Inadequate control of open fire	20	(1.6%)	0	(0.0%)	0	(0.6%)	$0.1	(0.5%)
Improper start-up or shut-down procedure	20	(1.3%)	1	(13.5%)	9	(12.9%)	$0.1	(0.6%)
Improper fueling technique	20	(1.3%)	0	(0.0%)	8	(11.6%)	$0.2	(1.1%)
Lightning	20	(1.0%)	0	(0.0%)	0	(0.0%)	$0.2	(1.1%)
Other known ignition factor	140	(9.2%)	2	(34.3%)	9	(12.2%)	$2.2	(10.6%)
Total	1,540	(100.0%)	6	(100.0%)	73	(100.0%)	$20.9	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Table 34A.
1999 U.S. Water Transport Vehicle Fires, by Factor Contributing to Ignition Grouping

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Misuse of material or product	**210**	**(16.7%)**	*****	**(*)**	**15**	**(20.8%)**	**$1.8**	**(8.4%)**
Cutting or welding too close	50	(3.7%)	*	(*)	0	(0.0%)	$0.4	(2.1%)
Heat source too close. to combustible	30	(2.8%)	*	(*)	0	(0.0%)	$0.0	(0.2%)
Unclassified or unknown-type misuse of material or product	30	(2.5%)	*	(*)	6	(8.3%)	$0.4	(1.9%)
Flammable liquid or gas spilled	30	(2.2%)	*	(*)	3	(4.2%)	$0.1	(0.6%)
Playing with heat source	20	(1.9%)	*	(*)	0	(0.0%)	$0.2	(1.1%)
Abandoned or discarded material	20	(1.5%)	*	(*)	0	(0.0%)	$0.0	(0.1%)
Improper fueling technique	20	(1.5%)	*	(*)	6	(8.3%)	$0.3	(1.5%)
Mechanical failure or malfunction	**210**	**(17.0%)**	*****	**(*)**	**47**	**(66.7%)**	**$4.7**	**(22.5%)**
Unclassified or unknown-type mechanical failure or malfunction	80	(6.2%)	*	(*)	0	(0.0%)	$1.1	(5.4%)
Leak or break	70	(5.6%)	*	(*)	47	(66.7%)	$3.1	(15.0%)
Backfire	50	(3.7%)	*	(*)	0	(0.0%)	$0.3	(1.5%)
Electrical failure or malfunction**	**350**	**(27.8%)**	*****	**(*)**	**50**	**(70.8%)**	**$5.1**	**(24.4%)**
Unspecified short circuit arc**	180	(14.5%)	*	(*)	0	(0.0%)	$2.8	(13.5%)
Unclassified or unknown-type electrical failure or malfunction**	90	(7.4%)	*	(*)	0	(0.0%)	$1.7	(8.1%)
Arc or spark from operating equipment*	20	(1.9%)	*	(*)	50	(70.8%)	$0.5	(2.3%)
Short circuit arc from mechanical damage**	20	(1.5%)	*	(*)	0	(0.0%)	$0.1	(0.2%)
Arc from faulty contact or broken conductor**	20	(1.2%)	*	(*)	0	(0.0%)	$0.0	(0.1%)
Fire spread or control	**220**	**(17.3%)**	*****	**(*)**	**0**	**(0.0%)**	**$4.4**	**(21.2%)**
Exposure to other fire	180	(14.2%)	*	(*)	0	(0.0%)	$4.2	(20.2%)
Open fire	30	(2.2%)	*	(*)	0	(0.0%)	$0.2	(0.9%)
Design, manufacturing or installation deficiency	**20**	**(1.5%)**	*****	**(*)**	**0**	**(0.0%)**	**$2.1**	(10.0%)
Installation deficiency	20	(1.2%)	*	(*)	0	(0.0%)	$2.1	(10.0%)
Operational deficiency	**50**	**(4.3%)**	*****	**(*)**	**6**	**(8.3%)**	**$0.9**	**(4.5%)**
Improper startup	30	(2.2%)	*	(*)	6	(8.3%)	$0.6	(2.7%)
Natural condition	**20**	**(1.2%)**	*****	**(*)**	**0**	**(0.0%)**	**$0.1**	**(0.5%)**

*The factor contributing to ignition in the fire deaths was undetermined.
** Conversion rules for data originally collected in Version 4.1 of NFIRS make double-counting common.

Table 34A.
1999 U.S. Water Transport Vehicle Fires, by Factor Contributing to Ignition Grouping (Continued)

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified factor contributed	**50**	**(3.7%)**	*****	**(*)**	**3**	**(4.2%)**	**$0.5**	**(2.6%)**
None	**50**	**(4.3%)**	*****	**(*)**	**0**	**(0.0%)**	**$1.4**	**(6.5%)**
Not reported (Captured under Broad Cause or Human Factor)	**270**	**(21.9%)**	*****	**(*)**	**3**	**(4.2%)**	$2.3	(11.0%)
Total	**1,250**	**(100.0%)**	**2**	**(100.0%)**	**71**	**(100.0%)**	**$20.8**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors, or because in Version 5.0 of NFIRS, more than one factor contributing to ignition could be entered. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the factor contributing to ignition was undetermined were allocated proportionally among fires with known factor contributing to ignition.

Source: NFIRS and NFPA survey.

Table 34B.
U.S. Water Transport Vehicle Fires, by Ignition Factor Grouping
1994-1998 Annual Averages

Ignition Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Mechanical or electrical failure	**540**	**(34.8%)**	**2**	**(38.6%)**	**24**	**(32.4%)**	**$8.4**	**(40.3%)**
Short circuit or ground fault	230	(14.9%)	0	(0.0%)	4	(5.2%)	$3.0	(14.5%)
Other electrical failure	90	(6.1%)	2	(27.3%)	3	(3.9%)	$1.3	(6.1%)
Part failure, leak or break	90	(5.9%)	0	(0.0%)	6	(8.4%)	$2.7	(13.2%)
Backfire	70	(4.3%)	0	(0.0%)	4	(4.9%)	$0.6	(3.1%)
Unclassified or unknown-type mechanical failure or malfunction	40	(2.9%)	1	(11.3%)	4	(5.8%)	$0.6	(2.9%)
Incendiary or suspicious	**390**	**(25.1%)**	**0**	**(0.0%)**	**3**	**(4.0%)**	**$6.1**	**(29.1%)**
Design, construction or installation deficiency	**210**	**(13.4%)**	**0**	**(0.0%)**	**1**	**(0.8%)**	**$2.1**	**(10.1%)**
Property too close	200	(12.7%)	0	(0.0%)	0	(0.0%)	$1.9	(9.1%)
Misuse of material ignited	**130**	**(8.4%)**	**1**	**(11.7%)**	**27**	**(37.3%)**	**$1.0**	**(5.0%)**
Fuel spilled or unintentionally released	50	(3.3%)	0	(0.0%)	12	(16.6%)	$0.3	(1.3%)
Combustible too close to heat	40	(2.4%)	0	(0.0%)	3	(4.3%)	$0.4	(1.9%)
Improper fueling technique	20	(1.3%)	0	(0.0%)	8	(11.6%)	$0.2	(1.1%)
Misuse of heat of ignition	**120**	**(7.9%)**	**1**	**(24.8%)**	**7**	**(9.9%)**	**$1.2**	**(5.7%)**
Cutting or welding too close	40	(2.9%)	1	(13.5%)	4	(4.9%)	$0.5	(2.3%)
Abandoned or discarded material	30	(1.8%)	0	(0.0%)	3	(3.5%)	$0.1	(0.4%)
Inadequate control of open fire	20	(1.6%)	0	(0.0%)	0	(0.6%)	$0.1	(0.5%)
Operational deficiency	**70**	**(4.8%)**	**1**	**(24.8%)**	**10**	**(14.3%)**	**$1.1**	**(5.3%)**
Improper start-up or shut-down procedures	20	(1.3%)	1	(13.5%)	9	(12.9%)	$0.1	(0.6%)
Natural condition	**30**	**(1.6%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.3**	**(1.3%)**
Lightning	20	(1.0%)	0	(0.0%)	0	(0.0%)	$0.2	(1.1%)
Other ignition factor	**60**	**(3.9%)**	**0**	**(0.0%)**	**1**	**(1.2%)**	**$0.7**	**(3.5%)**
Unclassified ignition factor	50	(3.5%)	0	(0.0%)	1	(1.2%)	$0.5	(2.2%)
Total	**1,540**	**(100.0%)**	**6**	**(100.0%)**	**73**	**(100.0%)**	**$20.9**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Table 35A.
1999 U.S. Water Transport Vehicle Fires, by Area of Fire Origin

Area of Fire Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine area, running gear or wheel area	330	(26.1%)	0	(0.0%)	17	(23.3%)	$5.3	(25.6%)
Operator and passenger area (combination area)	230	(18.5%)	0	(0.0%)	9	(13.3%)	$2.4	(11.7%)
Exterior, exposed vehicle surface	120	(9.5%)	0	(0.0%)	0	(0.0%)	$0.5	(2.2%)
Unclassified vehicle area	100	(7.8%)	2	(100.0%)	0	(0.0%)	$0.9	(4.4%)
Fuel tank or fuel line	70	(5.8%)	0	(0.0%)	36	(50.0%)	$0.5	(2.5%)
Separate operator or control area	60	(5.0%)	0	(0.0%)	2	(3.3%)	$1.2	(5.8%)
Unclassified area of origin	50	(4.3%)	0	(0.0%)	5	(6.7%)	$0.2	(0.8%)
Open outside area	50	(4.0%)	0	(0.0%)	0	(0.0%)	$0.1	(0.6%)
Cooking area or kitchen	30	(2.5%)	0	(0.0%)	0	(0.0%)	$3.0	(14.2%)
Machinery room or area or elevator machinery room	30	(2.3%)	0	(0.0%)	0	(0.0%)	$0.1	(0.4%)
Bedroom or sleeping area	20	(1.8%)	0	(0.0%)	2	(3.3%)	$0.9	(4.5%)
Common room, den, family room, living room or lounge	20	(1.3%)	0	(0.0%)	0	(0.0%)	$0.4	(1.8%)
Unclassified storage area	20	(1.3%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Exterior wall surface	20	(1.3%)	0	(0.0%)	0	(0.0%)	$0.1	(0.4%)
Heating equipment or water heater room or area	10	(1.0%)	0	(0.0%)	0	(0.0%)	$0.5	(2.2%)
Cargo or trunk area	10	(1.0%)	0	(0.0%)	0	(0.0%)	$0.0	(0.2%)
Other known area	80	(6.8%)	0	(0.0%)	0	(0.0%)	$4.7	(22.5%)
Total	1,250	(100.0%)	2	(100.0%)	71	(100.0%)	$20.8	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the area or origin was unknown or not reported were allocated proportionally among fires with known area of origin.

Source: NFIRS and NFPA survey.

Table 35B.
U.S. Water Transport Vehicle Fires, by Area of Fire Origin
1994-1998 Annual Averages

Area of Fire Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine, running gear or wheel area of vehicle	460	(30.1%)	0	(0.0%)	35	(47.3%)	$6.3	(30.0%)
Passenger area	230	(15.2%)	0	(5.0%)	8	(10.4%)	$2.5	(12.2%)
Exterior surface of vehicle	210	(13.5%)	0	(6.0%)	2	(2.1%)	$1.1	(5.2%)
Operating or control area of vehicle	110	(7.3%)	0	(0.0%)	3	(4.1%)	$2.3	(11.0%)
Unclassified vehicle area	90	(5.7%)	1	(10.1%)	6	(7.8%)	$0.8	(4.0%)
Fuel tank or fuel line of vehicle	80	(5.2%)	1	(10.2%)	9	(12.6%)	$0.5	(2.4%)
Unclassified area of origin	60	(4.1%)	0	(5.0%)	1	(1.9%)	$1.1	(5.3%)
Lawn, field or open area	50	(3.0%)	0	(0.0%)	0	(0.0%)	$0.2	(0.9%)
Kitchen or cooking area	30	(2.0%)	1	(23.2%)	5	(6.8%)	$0.4	(2.0%)
Area of origin not applicable	20	(1.5%)	0	(0.0%)	0	(0.0%)	$0.1	(0.6%)
Bedroom or sleeping area	20	(1.3%)	0	(5.2%)	0	(0.0%)	$2.1	(9.9%)
Trunk or load carrying area of vehicle	20	(1.1%)	0	(0.0%)	0	(0.0%)	$0.1	(0.7%)
Garage, carport or vehicle storage area	20	(1.0%)	0	(0.0%)	0	(0.0%)	$0.2	(1.1%)
Exterior wall surface	20	(1.0%)	0	(0.0%)	0	(0.0%)	$0.7	(3.5%)
Machinery room or area	10	(1.0%)	0	(0.0%)	1	(1.8%)	$0.1	(0.4%)
Other known area	110	(7.1%)	2	(35.2%)	4	(5.1%)	$2.3	(10.8%)
Total	1,540	(100.0%)	6	(100.0%)	73	(100.0%)	$20.9	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the area or origin was unknown or not reported were allocated proportionally among fires with known area of origin.

Source: NFIRS and NFPA survey.

Table 36A. 1999 U.S. Water Transport Vehicle Fires, by Item First Ignited

Item First Ignited	Fires	Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable liquid or gas in or from final container	200	(15.7%)	0 (*.*%)	15	(21.4%)	$5.0	(24.1%)
Unclassified item first ignited	170	(13.5%)	0 (*.*%)	0	(0.0%)	$1.9	(9.3%)
Electrical wire or cable insulation	170	(13.5%)	0 (*.*%)	0	(0.0%)	$1.9	(9.2%)
Multiple items first ignited	100	(8.3%)	0 (*.*%)	0	(0.0%)	$1.1	(5.2%)
Unclassified or unknown-type structural member or finish	90	(7.1%)	0 (*.*%)	0	(0.0%)	$5.8	(27.7%)
Tarpaulin or tent	60	(5.1%)	0 (*.*%)	0	(0.0%)	$0.3	(1.5%)
Exterior wall covering or finish	50	(4.2%)	0 (*.*%)	0	(0.0%)	$0.3	(1.4%)
Upholstered sofa, chair or vehicle seat	40	(3.5%)	0 (*.*%)	3	(3.6%)	$1.3	(6.1%)
Floor covering, rug, carpet or mat	40	(3.2%)	0 (*.*%)	0	(0.0%)	$0.2	(1.0%)
Flammable liquid or gas in container or pipe	40	(2.9%)	0 (*.*%)	43	(60.7%)	$0.5	(2.3%)
Rubbish, trash or waste	30	(2.6%)	0 (*.*%)	0	(0.0%)	$0.3	(1.3%)
Structural member or framing	20	(1.9%)	0 (*.*%)	0	(0.0%)	$0.2	(0.8%)
Unclassified or unknown-type adornment, recreational material or sign	20	(1.6%)	0 (*.*%)	0	(0.0%)	$0.1	(0.4%)
Awning or canopy	20	(1.6%)	0 (*.*%)	0	(0.0%)	$0.1	(0.4%)
Flammable liquid or gas in or from engine or burner	20	(1.6%)	0 (*.*%)	3	(3.6%)	$0.1	(0.5%)
Unclassified or unknown-type liquid, piping or filter	20	(1.3%)	0 (*.*%)	5	(7.1%)	$0.1	(0.7%)
Exterior roof covering or finish	10	(1.0%)	0 (*.*%)	0	(0.0%)	$0.0	(0.1%)
Interior wall covering excluding drapes	10	(1.0%)	0 (*.*%)	0	(0.0%)	$0.1	(0.4%)
Cabinetry, including built-in cabinets	10	(1.0%)	0 (*.*%)	0	(0.0%)	$0.8	(3.8%)
Box, carton, bag, basket or barrel	10	(1.0%)	0 (*.*%)	0	(0.0%)	$0.0	(0.1%)
Atomized liquid, vaporized liquid or aerosol.	10	(1.0%)	0 (*.*%)	0	(0.0%)	$0.1	(0.5%)
Other known item	100	(7.7%)	0 (*.*%)	3	(3.6%)	$0.7	(3.2%)
Total	1,250	(100.0%)	2 (100.0%)	71	(100.0%)	$20.8	(100.0%)

* The item first ignited was unknown or undetermined in all fire deaths.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the item first ignited was unknown or not reported were allocated proportionally among fires with known item first ignited.

Source: NFIRS and NFPA survey.

Table 36B.
U.S. Water Transport Vehicle Fires, by Form of Material First Ignited
1994-1998 Annual Averages

Form of Material	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Fuel	320	(20.8%)	1	(19.1%)	44	(59.5%)	$2.6	(12.3%)
Unclassified or unknown-type other material*	240	(15.7%)	0	(0.0%)	4	(5.5%)	$2.3	(10.9%)
Electrical wire or cable insulation	230	(14.7%)	0	(0.0%)	4	(5.2%)	$3.2	(15.3%)
Multiple forms of material	130	(8.1%)	0	(0.0%)	3	(4.3%)	$2.1	(10.2%)
Unclassified or unknown-type structural component or finish	80	(4.9%)	1	(22.7%)	3	(4.2%)	$1.5	(7.3%)
Upholstered seat	70	(4.3%)	1	(9.4%)	1	(2.0%)	$0.5	(2.5%)
Accelerant, gas or liquid in or from a pipe or container	60	(4.0%)	0	(0.0%)	5	(6.5%)	$0.5	(2.6%)
Tarpaulin or tent	60	(3.6%)	0	(0.0%)	1	(0.7%)	$0.2	(0.8%)
Exterior sidewall covering or finish	50	(3.0%)	0	(0.0%)	0	(0.0%)	$1.4	(6.7%)
Structural member or framing	40	(2.6%)	0	(0.0%)	0	(0.0%)	$0.9	(4.1%)
Interior wall covering	30	(2.0%)	1	(9.4%)	1	(0.8%)	$0.7	(3.5%)
Floor covering or surface	30	(1.9%)	0	(0.0%)	1	(0.8%)	$0.2	(1.1%)
Rubbish, trash or waste	20	(1.5%)	0	(0.0%)	0	(0.0%)	$0.0	(0.2%)
Other known form	200	(12.8%)	2	(39.5%)	7	(10.2%)	$4.7	(22.6%)
Total	1,540	(100.0%)	6	(100.0%)	73	(100.0%)	$20.9	(100.0%)

*Unclassified or unknown-type other form includes code 99, "Unclassified form of material," and code 90, an unassigned code in the "Other form of material" category.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the form of material first ignited was unknown or not reported were allocated proportionally among fires with known form of material first ignited.

Source: NFIRS and NFPA survey.

Table 37. U.S. Water Transport Vehicle Fires, by Type of Material First Ignited
1994-1998 Annual Averages

Type of Material	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Plastic	**440**	**(28.4%)**	**1**	**(9.4%)**	**8**	**(10.5%)**	**$5.5**	**(26.4%)**
Polyester	90	(5.9%)	0	(0.0%)	1	(1.2%)	$1.1	(5.1%)
Polyvinyl	70	(4.9%)	0	(0.0%)	2	(3.0%)	$2.0	(9.4%)
Polyurethane	20	(1.5%)	1	(9.4%)	2	(3.3%)	$0.2	(1.2%)
Unclassified or unknown-type plastic	230	(15.0%)	0	(0.0%)	2	(3.0%)	$2.1	(10.1%)
Flammable or combustible liquid	**400**	**(25.7%)**	**2**	**(28.5%)**	**50**	**(67.7%)**	**$3.4**	**(16.3%)**
Gasoline	310	(20.2%)	1	(19.1%)	43	(58.4%)	$2.4	(11.7%)
Class IA flammable liquid	20	(1.2%)	0	(0.0%)	2	(3.2%)	$0.2	(0.8%)
Class II combustible liquid	20	(1.1%)	1	(9.4%)	1	(2.0%)	$0.4	(1.8%)
Unclassified or unknown-type flammable or combustible liquid	30	(1.9%)	0	(0.0%)	1	(0.7%)	$0.3	(1.4%)
Fabric, textile or fur	**150**	**(9.5%)**	**1**	**(11.2%)**	**3**	**(4.8%)**	**$1.1**	**(5.1%)**
Manufactured fabric of fiber	100	(6.2%)	1	(11.2%)	2	(2.5%)	$0.8	(3.7%)
Cotton, rayon or cotton fabric	40	(2.3%)	0	(0.0%)	1	(0.8%)	$0.2	(1.1%)
Wood or paper	**140**	**(8.9%)**	**1**	**(22.7%)**	**3**	**(4.3%)**	**$2.9**	**(14.0%)**
Sawn wood	70	(4.4%)	0	(0.0%)	1	(0.8%)	$1.8	(8.5%)
Hardboard or plywood	30	(1.8%)	1	(22.7%)	0	(0.0%)	$0.7	(3.6%)
Unclassified or unknown-type wood or paper	20	(1.2%)	0	(0.0%)	0	(0.0%)	$0.2	(1.1%)
Natural product	**70**	**(4.3%)**	**0**	**(0.0%)**	**1**	**(1.9%)**	**$2.8**	**(13.3%)**
Rubber	50	(3.3%)	0	(0.0%)	1	(1.9%)	$2.7	(12.8%)
Volatile solid or chemical	**50**	**(3.1%)**	**2**	**(28.3%)**	**1**	**(1.7%)**	**$0.3**	**(1.7%)**
Applied paint or varnish	20	(1.3%)	1	(18.9%)	0	(0.0%)	$0.1	(0.6%)
Adhesive, resin or tar	20	(1.1%)	0	(0.0%)	1	(1.7%)	$0.2	(0.8%)
Gas	**50**	**(3.0%)**	**0**	**(0.0%)**	**4**	**(5.4%)**	**$0.3**	**(1.6%)**
Unclassified or unknown-type gas	30	(1.7%)	0	(0.0%)	1	(2.0%)	$0.3	(1.2%)
Material compounded with oil	**40**	**(2.3%)**	**0**	**(0.0%)**	**1**	**(0.8%)**	**$0.2**	**(0.9%)**
Waterproof canvas	20	(1.6%)	0	(0.0%)	0	(0.0%)	$0.1	(0.5%)
Other type of material	**230**	**(14.7%)**	**0**	**(0.0%)**	**2**	**(3.1%)**	**$4.3**	**(20.7%)**
Unclassified type of material	110	(7.2%)	0	(0.0%)	2	(2.4%)	$2.1	(10.3%)
Multiple types of material	110	(7.2%)	0	(0.0%)	1	(0.7%)	$2.2	(10.3%)
Total	**1,540**	**(100.0%)**	**6**	**(100.0%)**	**73**	**(100.0%)**	**$20.9**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the type of material first ignited was unknown or not reported were allocated proportionally among fires with known type of material first ignited.
Source: NFIRS and NFPA survey.

U.S. Rail Transport Vehicle Fire Problem

An estimated 600 rail transport vehicle fires were reported in 1999.
During 1999, an estimated 600 rail transport vehicle fires were reported to U.S. fire departments. These fires caused an estimated 22 civilian deaths, 294 civilian fire injuries and $32,100,000 in direct property damage. Reported rail transport vehicle fires fell by just 1% from 610 in 1998 to 600 in 1999. From 1980, the first year NFPA began tracking with current methods, to 1998, rail transport vehicle fires fell 77%. (See Table 38.)

On average, 650 rail transport vehicles were reported to public fire departments per year during the five-year period from 1994 through 1998. These fires caused an annual average of six civilian deaths, 12 civilian injuries and $21,000,000 in direct property damage.

Rail transport vehicles accounted for a disproportionate share of the vehicle fire losses.
In 1999, rail transport vehicles accounted for 0.2% of the 369,090 reported vehicle fires, 4.7% of the 469 vehicle fire deaths, 3.9% of the 1,846 civilian injuries, and 1.6% of the $1,323,200,000 in direct property damage.

During 1994-1998, the 650 rail transport vehicle fires accounted for 0.2% of the 399,940 motor vehicle fires, 1.0% of the 586 vehicle fire deaths, 0.5% of the 2,346 vehicle fire injuries and 1.7% of the $1,240,700,000 in direct vehicle property damage caused by vehicle fires per year. (See Table 2.)

Two types of rail cars accounted for more than half of rail transport vehicle fires.
Table 39 shows that two types of cars account for more than half of the rail transport vehicle fires. Thirty percent of these fires began in the engine or locomotive, and 26-34% started in freight, box or hopper cars.

Smallest number of rail transport vehicle fires was seen from 3:00-6:00 a.m.
Patterns for month, day and time of day are displayed in Tables 40, 41 and 42. The distribution by month and day varied considerably between the two time periods, although Table 41 shows Thursday was the peak day for these fires in both periods. The smallest share of rail transport vehicle fires occurred between 3:00 and 6:00 a.m. The frequency increased through the day, peaking between 3:00 and 6:00 p.m. in 1994-1998, and between 6:00 and 9:00 p.m. in 1999.

Most rail transport vehicle fires occurred on railroad properties.
Table 43 shows that roughly two-thirds of the rail transport vehicle fires occurred on some type of railroad property. Seven to nine percent of these fires began on streets or driveways.

Equipment problems caused the largest share of these fires.
The causes of rail transport vehicle fires are shown in Tables 44 and 45. In 1999, 49% of these fires resulted from a failure of equipment or heat source. In 1994-1998, mechanical or electrical failures caused 44% of these fires. Seventeen to eighteen percent of these fires were intentionally set. Unlike the other vehicle groups, intentional rail vehicle fires

caused only 7% of the dollar loss, a disproportionally *small* share of the property damage. Although collisions and overturns accounted for only 2% of these fires, they caused 41%-56% of the dollar loss.

Table 46 shows that 35-38% of the fires in rail transport vehicles began in the engine, running gear or wheel area 17-19% started in the cargo or load carrying area.

Fuel was the form of material first ignited in roughly one-fifth of rail transport fires.
Table 47 shows the items or forms of material first ignited in rail transport vehicle fires. In roughly one-fifth of these fires, fuel or a flammable liquid or gas was the form of material or item first ignited. Unclassified forms were first ignited in 15-19% of these fires and electrical wire or cable insulation was first ignited in 11-16% of these incidents.

Wood or paper was the most common type of material first ignited, but flammable or combustible liquids caused the largest share of dollar loss.
Due to changes in the coding rules for Version 5.0 of NFIRS, the type of material first ignited is provided for the 1994-1998 period only. Table 48 shows the types of material first ignited in rail transport vehicle fires. Wood or paper was the type of material first ignited in 31% of these fires, causing 11% of the dollar loss. Sawn wood was the type of material first ignited in 12% of the fires; untreated or uncoated paper was first ignited in 7% of these incidents.

Flammable or combustible liquids were first ignited in 19% of the rail transport vehicle fires, accounting for 60% of the dollar loss. Class II combustible liquids, which include diesel fuel, accounted for 8% of the fires and 50% of the direct property damage.

Some type of natural product was first ignited in 16% of these fires, resulting in 6% of the dollar loss. Coal, coke, briquettes or peat was first ignited in 7% of these fires, but these incidents caused less than 1% of the dollar loss.

Additional information is in the NFPA *Fire Protection Handbook*
Two chapters in the NFPA *Fire Protection Handbook,* nineteenth edition, provide additional information on fire protection and safety issues in this property class. Frank J. Chiak's "Fixed Guideway Transit Systems" discusses fire safety in rapid transit systems. "Rail Transportation Systems," revised by James P. Gourley, Arthur Candenquist and Scott Gorton, addresses issues of fire safety and hazardous materials in rail transport.

Reports of the U.S. National Transportation Safety Board's (NTSB's) recent investigations into railroad accidents are available on-line at http://www.ntsb.gov/Publictn/R_Acc.htm. The reports include the passenger train and truck collision and resulting fire in Illinois on March 15, 1999 that claimed 11 lives. Five of the deaths were due to fire.[10]

[10] National Transportation Safety Board, *Railroad Accident Report: Collision of National Railroad Passenger Corporation (Amtrak) Train 59 with a Loaded Truck-Semitrailer Combination at a Highway/Rail Grade Crossing in Bourbonnais, Illinois, March, 15, 1999,* Washington, D.C., NTSB/RAR-02/01, 2002, p. 11, available at http://www.ntsb.gov/publictn/2002/RAR0201.pdf.

Table 38.
U.S. Rail Transport Vehicle Fire Problem, by Year: 1980-1999

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)	Loss in 1999 Dollars
1980	2,580	0	15	$18.7	$37.9
1981	2,390	3	21	$12.3	$22.6
1982	1,800	7	143	$48.6	$83.8
1983	1,570	0	8	$9.3	$15.5
1984	1,650	6	19	$16.1	$25.8
1985	1,220	0	35	$7.7	$11.8
1986	1,280	4	6	$6.2	$9.4
1987	1,280	4	13	$22.8	$33.4
1988	1,290	2	11	$33.6	$47.3
1989	910	0	2	$12.9	$17.4
1990	930	8	20	$12.2	$15.6
1991	910	0	13	$31.5	$38.5
1992	650	0	2	$8.0	$9.5
1993	660	0	16	$15.0	$17.3
1994	650	0	4	$16.4	$18.4
1995	610	3	27	$16.9	$18.5
1996	600	18	6	$21.0	$22.4
1997	790	7	20	$38.1	$39.5
1998	610	0	3	$12.4	$12.7
1980-1998 Annual average	1,180	3	20	$18.9	$26.2
1994-1998 Annual average	650	6	12	$21.0	$22.3
1999*	600	22	294	$32.1	$32.1

* NFIRS data for 1999 was received in the Version 5.0 format and involves enough coding changes that it can better be analyzed separately from data from previous years.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation.

Source: NFIRS and NFPA survey, "Purchasing Power of the Dollar" custom table from Bureau of Labor Statistics at http://www.bls.gov/cpi/.

Table 39A.
1999 U.S. Rail Vehicle Transport Fire Problem, by Type of Vehicle

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine or locomotive	180	(29.6%)	0	(0.0%)	2	(0.8%)	$10.3	(32.0%)
Box, freight, or hopper car	160	(26.3%)	0	(0.0%)	0	(0.0%)	$3.9	(12.0%)
Diner or passenger car	50	(8.5%)	20	(92.3%)	292	(99.2%)	$1.9	(5.8%)
Maintenance equipment car	40	(6.6%)	0	(0.0%)	0	(0.0%)	$0.1	(0.3%)
Container or piggyback car	30	(4.7%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Self-powered rapid transit car or trolley	20	(3.8%)	0	(0.0%)	0	(0.0%)	$0.1	(0.3%)
Tank car	10	(1.9%)	0	(0.0%)	0	(0.0%)	$0.1	(0.4%)
Unclassified or unknown-type rail transport	110	(18.8%)	2	(7.7%)	0	(0.0%)	$15.7	(49.0%)
Total	600	(100.0%)	22	(100.0%)	294	(100.0%)	$32.1	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 39B.
U.S. Rail Vehicle Transport Fire Problem, by Type of Vehicle
1994-1998 Annual Averages

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Freight, box or hopper car	220	(33.8%)	0	(0.0%)	0	(0.0%)	$2.8	(13.2%)
Locomotive or engine	200	(30.0%)	2	(37.9%)	4	(32.2%)	$11.5	(54.7%)
Passenger or diner car	60	(8.6%)	3	(51.7%)	4	(33.9%)	$1.2	(5.9%)
Maintenance equipment car	40	(6.2%)	0	(0.0%)	0	(3.4%)	$0.5	(2.3%)
Self-powered car, trolley or rapid-transit car	30	(4.4%)	0	(0.0%)	1	(6.8%)	$0.1	(0.5%)
Container or piggy back car	20	(2.6%)	0	(0.0%)	1	(6.8%)	$0.1	(0.7%)
Tank car	10	(1.4%)	0	(0.0%)	0	(3.4%)	$0.9	(4.4%)
Unclassified or unknown-type rail transport vehicle	90	(13.1%)	1	(10.3%)	2	(13.6%)	$3.8	(18.3%)
Total	650	(100.0%)	6	(100.0%)	12	(100.0%)	$21.0	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 40A.
1999 U.S. Rail Transport Vehicle Fires, by Month

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	60	(10.8%)	0	(0.0%)	0	(0.0%)	$14.2	(44.2%)
February	30	(4.7%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
March	50	(8.0%)	20	(92.3%)	292	(99.2%)	$5.9	(18.4%)
April	40	(6.1%)	0	(0.0%)	0	(0.0%)	$0.2	(0.8%)
May	60	(9.4%)	2	(7.7%)	0	(0.0%)	$0.8	(2.6%)
June	30	(5.2%)	0	(0.0%)	0	(0.0%)	$0.1	(0.2%)
July	70	(12.2%)	0	(0.0%)	0	(0.0%)	$0.4	(1.3%)
August	60	(10.8%)	0	(0.0%)	2	(0.8%)	$5.6	(17.4%)
September	50	(7.5%)	0	(0.0%)	0	(0.0%)	$1.5	(4.6%)
October	60	(9.4%)	0	(0.0%)	0	(0.0%)	$0.3	(0.9%)
November	50	(8.5%)	0	(0.0%)	0	(0.0%)	$2.0	(6.4%)
December	50	(7.5%)	0	(0.0%)	0	(0.0%)	$1.0	(3.2%)
Total	600	(100.0%)	22	(100.0%)	294	(100.0%)	$32.1	(100.0%)
Monthly average	50	(8.3%)	2	(8.3%)	24	(8.3%)	$2.7	(8.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 40B.
U.S. Rail Transport Vehicle Fires, by Month
1994-1998 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	50	(7.6%)	0	(0.0%)	2	(13.3%)	$1.3	(6.4%)
February	50	(8.3%)	3	(50.0%)	1	(8.3%)	$2.3	(11.1%)
March	60	(9.8%)	0	(6.7%)	0	(3.3%)	$1.5	(6.9%)
April	50	(7.8%)	0	(0.0%)	0	(0.0%)	$0.3	(1.6%)
May	50	(8.3%)	0	(0.0%)	0	(0.0%)	$1.2	(5.9%)
June	60	(9.4%)	1	(23.3%)	1	(8.3%)	$2.6	(12.6%)
July	60	(8.6%)	0	(0.0%)	0	(3.3%)	$3.6	(17.4%)
August	60	(9.7%)	0	(0.0%)	5	(40.0%)	$1.6	(7.8%)
September	50	(7.4%)	0	(0.0%)	0	(0.0%)	$0.5	(2.4%)
October	60	(9.7%)	0	(0.0%)	2	(16.7%)	$2.8	(13.3%)
November	40	(6.6%)	0	(6.7%)	0	(3.3%)	$1.7	(8.1%)
December	40	(6.9%)	1	(13.3%)	0	(3.3%)	$1.3	(6.4%)
Total	650	(100.0%)	6	(100.0%)	12	(100.0%)	$21.0	(100.0%)
Monthly average	50	(8.3%)	1	(8.3%)	1	(8.3%)	$1.7	(8.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 41A.
1999 U.S. Rail Transport Vehicle Fires, by Day of Week

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	80	(14.1%)	0	(0.0%)	2	(0.8%)	$15.2	(47.4%)
Monday	90	(15.5%)	20	(92.3%)	292	(99.2%)	$0.5	(1.4%)
Tuesday	80	(14.1%)	2	(7.7%)	0	(0.0%)	$9.6	(30.1%)
Wednesday	70	(11.3%)	0	(0.0%)	0	(0.0%)	$0.8	(2.6%)
Thursday	100	(16.4%)	0	(0.0%)	0	(0.0%)	$3.7	(11.6%)
Friday	90	(15.0%)	0	(0.0%)	0	(0.0%)	$0.8	(2.6%)
Saturday	80	(13.6%)	0	(0.0%)	0	(0.0%)	$1.4	(4.4%)
Total	600	(100.0%)	22	(100.0%)	294	(100.0%)	$32.1	(100.0%)
Daily average	90	(14.3%)	3	(14.3%)	42	(14.3%)	$4.6	(14.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the day of week was unknown or not reported have been allocated proportionally among fires with known day of week.

Source: NFIRS and NFPA survey.

Table 41B.
U.S. Rail Transport Vehicle Fires, by Day of Week
1994-1998 Annual Averages

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	90	(14.0%)	2	(30.9%)	1	(8.7%)	$1.1	(5.1%)
Monday	90	(14.1%)	0	(6.4%)	4	(31.1%)	$2.3	(10.8%)
Tuesday	90	(14.4%)	0	(0.0%)	1	(11.3%)	$3.2	(15.4%)
Wednesday	100	(15.4%)	0	(0.0%)	0	(3.3%)	$5.7	(27.4%)
Thursday	100	(15.5%)	0	(0.0%)	1	(7.4%)	$2.3	(11.2%)
Friday	90	(14.2%)	3	(57.3%)	1	(10.9%)	$3.2	(15.4%)
Saturday	80	(12.4%)	0	(5.5%)	3	(27.3%)	$3.1	(14.8%)
Total	650	(100.0%)	6	(100.0%)	12	(100.0%)	$21.0	(100.0%)
Daily average	90	(14.3%)	1	(14.3%)	2	(14.3%)	$3.0	(14.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the day of week was unknown or not reported have been allocated proportionally among fires with known day of week.

Source: NFIRS and NFPA survey.

Table 42A.
U.S. Rail Transport Vehicle Fires, by Time of Day
1994-1998 Annual Averages

Time of Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
12:01 - 3:00 a.m.	70	(11.3%)	0	(0.0%)	0	(0.0%)	$11.9	(37.2%)
3:01 - 6:00 a.m.	30	(5.2%)	0	(0.0%)	2	(0.8%)	$0.6	(2.0%)
6:01 - 9:00 a.m.	40	(7.0%)	0	(0.0%)	0	(0.0%)	$6.0	(18.6%)
9:01 - Noon	80	(13.1%)	2	(7.7%)	0	(0.0%)	$2.7	(8.3%)
12:01 - 3:00 p.m.	90	(15.5%)	0	(0.0%)	0	(0.0%)	$4.8	(15.1%)
3:01 - 6:00 p.m.	100	(17.4%)	2	(7.7%)	0	(0.0%)	$3.4	(10.6%)
6:01 - 9:00 p.m.	110	(18.8%)	0	(0.0%)	0	(0.0%)	$2.4	(7.6%)
9:01 - Midnight	70	(11.7%)	19	(84.6%)	292	(99.2%)	$0.2	(0.6%)
Total	600	(100.0%)	22	(100.0%)	294	(100.0%)	$32.1	(100.0%)
Average	80	(12.5%)	3	(12.5%)	37	(12.5%)	$4.0	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 42B.
U.S. Rail Transport Vehicle Fires, by Time of Day
1994-1998 Annual Averages

Time of Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
12:01 - 3:00 a.m.	60	(9.7%)	0	(6.7%)	1	(5.0%)	$4.0	(18.9%)
3:01 - 6:00 a.m.	50	(7.6%)	0	(0.0%)	1	(11.7%)	$2.8	(13.4%)
6:01 - 9:00 a.m.	70	(10.2%)	0	(0.0%)	0	(0.0%)	$1.0	(4.9%)
9:01 - Noon	80	(12.3%)	0	(0.0%)	0	(0.0%)	$2.7	(12.9%)
12:01 - 3:00 p.m.	90	(14.4%)	0	(6.7%)	6	(50.0%)	$3.1	(14.9%)
3:01 - 6:00 p.m.	120	(18.0%)	3	(56.7%)	1	(6.7%)	$3.6	(17.0%)
6:01 - 9:00 p.m.	100	(15.3%)	0	(6.7%)	2	(18.3%)	$1.7	(8.0%)
9:01 – Midnight	80	(12.4%)	1	(23.3%)	1	(8.3%)	$2.1	(9.9%)
Total	650	(100.0%)	6	(100.0%)	12	(100.0%)	$21.0	(100.0%)
Average	80	(12.5%)	1	(12.5%)	2	(12.5%)	$2.6	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 43A.
1999 U.S. Rail Transport Fires, by Fixed Property Use

Fixed Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Railroad yard	210	(34.3%)	0	(0.0%)	2	(0.8%)	$10.1	(31.5%)
Railroad right of way	190	(31.9%)	19	(84.6%)	292	(99.2%)	$20.9	(65.0%)
Residential street, road or residential driveway	60	(9.4%)	3	(15.4%)	0	(0.0%)	$0.1	(0.3%)
Manufacturing or processing property	10	(2.3%)	0	(0.0%)	0	(0.0%)	$0.2	(0.7%)
Unclassified or unknown-type vehicle storage	10	(2.3%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Highway or divided highway	10	(1.4%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Vehicle parking area	10	(1.4%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Other known property	60	(9.9%)	0	(0.0%)	0	(0.0%)	$0.3	(0.8%)
Unclassified or unknown-type property use	40	(7.0%)	0	(0.0%)	0	(0.0%)	$0.5	(1.5%)
Total	600	(100.0%)	22	(100.0%)	294	(100.0%)	$32.1	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 43B.
U.S. Rail Transport Fires, by Fixed Property Use
1994-1998 Annual Averages

Fixed Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Railroad right of way	210	(31.9%)	3	(43.6%)	8	(67.4%)	$12.0	(57.1%)
Unclassified or unknown-type railroad property	100	(15.3%)	0	(0.0%)	1	(4.3%)	$3.1	(15.0%)
Switch yard or marshalling yard	80	(12.2%)	0	(0.0%)	1	(10.2%)	$0.6	(2.7%)
Railroad siding	50	(8.0%)	0	(0.0%)	0	(0.0%)	$0.9	(4.5%)
Paved public street	40	(6.5%)	0	(0.0%)	0	(0.0%)	$0.1	(0.6%)
Fixed property use not applicable	20	(2.9%)	3	(50.9%)	0	(3.3%)	$1.1	(5.4%)
Railway equipment manufacture or repair	10	(2.2%)	0	(0.0%)	1	(4.4%)	$0.0	(0.2%)
Railway storage	10	(1.8%)	0	(0.0%)	0	(0.0%)	$0.4	(2.1%)
Uncovered parking area	10	(1.8%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Open land or field	10	(1.1%)	0	(0.0%)	0	(0.0%)	$0.4	(1.9%)
Limited access or divided highway	10	(1.0%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Other known fixed property use	70	(11.0%)	0	(0.0%)	1	(10.4%)	$0.9	(4.4%)
Unclassified or unknown-type fixed property use	30	(4.3%)	0	(5.5%)	0	(0.0%)	$1.2	(5.9%)
Total	650	(100.0%)	6	(100.0%)	12	(100.0%)	$21.0	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 44A.
1999 U.S. Rail Transport Vehicle Fires, by Factor Contributing to Ignition

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Leak or break	90	(14.5%)	0	(0.0%)	2	(0.8%)	$1.6	(5.0%)
Unclassified or unknown-type mechanical failure or malfunction	80	(12.8%)	0	(0.0%)	0	(0.0%)	$2.2	(6.9%)
Unspecified short circuit arc*	70	(11.6%)	0	(0.0%)	0	(0.0%)	$1.1	(3.5%)
Cutting or welding too close to combustible materials	60	(10.5%)	0	(0.0%)	0	(0.0%)	$0.3	(1.0%)
Unclassified or unknown-type electrical failure or malfunction*	40	(6.4%)	0	(0.0%)	0	(0.0%)	$2.5	(7.9%)
Unclassified factor contributed	30	(4.7%)	19	(84.6%)	292	(99.2%)	$1.9	(5.8%)
Unclassified or unknown-type natural condition	20	(3.5%)	0	(0.0%)	0	(0.0%)	$0.1	(0.3%)
Short circuit arc from defective or worn insulation*	20	(2.9%)	0	(0.0%)	0	(0.0%)	$0.2	(0.6%)
Collision, knock down, run over or overturn	20	(2.9%)	2	(7.7%)	0	(0.0%)	$18.1	(56.4%)
Exposure to other fire	20	(2.9%)	0	(0.0%)	0	(0.0%)	$3.3	(10.3%)
Flammable liquid or gas spilled	10	(2.3%)	0	(0.0%)	0	(0.0%)	$0.3	(0.8%)
Backfire	10	(2.3%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Unclassified or unknown-type misuse of material or product	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Abandoned or discarded materials or products	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Worn out	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Arc from faulty contact or broken conductor*	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.2%)
Heat source too close to combustibles	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.3	(0.9%)
Improper container or storage	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Unclassified or unknown-type operational deficiency	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Overloaded equipment*	10	(1.2%)	0	(0.0%)	0	(0.0%)	$1.0	(3.0%)
Rekindle	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
No contributing factor	20	(3.5%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Not reported (Captured under Broad Cause or Human Factor)	110	(18.0%)	2	(7.7%)	0	(0.0%)	$2.3	(7.2%)
Other known factor	20	(3.5%)	0	(0.0%)	0	(0.0%)	$0.1	(0.4%)
Total	600	(100.0%)	22	(100.0%)	294	(100.0%)	$32.1	(100.0%)

* Conversion rules for data originally collected in Version 4.1 of NFIRS make double-counting common.

Table 44A.
1999 U.S. Rail Transport Vehicle Fires, by Factor Contributing to Ignition
(Continued)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors, or because in Version 5.0 of NFIRS, more than one factor contributing to ignition could be entered. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the factor contributing to ignition was undetermined were allocated proportionally among fires with known factor contributing to ignition.

Source: NFIRS and NFPA survey.

Table 44B.
1999 U.S. Rail Transport Vehicle Fires, by Broad Cause

Broad Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Failure of equipment or heat source	300	(49.2%)	0	(0.0%)	2	(0.8%)	$6.9	(21.4%)
Unintentional	170	(28.8%)	2	(7.7%)	0	(0.0%)	$18.3	(56.9%)
Intentional	100	(16.9%)	2	(7.7%)	0	(0.0%)	$2.2	(6.8%)
Unclassified cause	30	(5.1%)	19	(84.6%)	292	(99.2%)	$4.8	(14.9%)
Total	600	(100.0%)	22	(100.0%)	294	(100.0%)	$32.1	(100.0%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the broad cause was under investigation, undetermined or not reported were allocated proportionally among fires with known cause.

Source: NFIRS and NFPA survey.

Table 44C.
U.S. Rail Transport Vehicle Fires, by Ignition Factor
1994-1998 Annual Averages

Ignition Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Incendiary or suspicious	120	(18.2%)	0	(0.0%)	1	(11.9%)	$1.4	(6.6%)
Part failure, leak or break	110	(16.5%)	0	(0.0%)	0	(0.0%)	$4.8	(23.0%)
Cutting or welding too close	60	(9.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.4%)
Short circuit or ground fault	60	(9.1%)	0	(0.0%)	1	(6.6%)	$2.0	(9.6%)
Unclassified or unknown-type mechanical failure or malfunction	50	(8.2%)	0	(0.0%)	0	(0.0%)	$0.5	(2.6%)
Spontaneous heating	40	(5.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.6%)
Other electrical failure	30	(4.4%)	0	(0.0%)	1	(5.0%)	$0.3	(1.3%)
Lack of maintenance	30	(3.9%)	0	(0.0%)	1	(6.7%)	$0.2	(1.1%)
Unclassified ignition factor	20	(3.6%)	2	(30.9%)	2	(13.3%)	$1.2	(5.7%)
Combustible too close to heat	20	(2.9%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Collision or overturn	10	(2.1%)	4	(69.1%)	5	(46.0%)	$8.5	(40.6%)
Abandoned or discarded material	10	(1.8%)	0	(0.0%)	0	(0.0%)	$0.1	(0.3%)
Property too close to	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.6%)
Backfire	10	(1.6%)	0	(0.0%)	0	(0.0%)	$0.2	(0.8%)
Unclassified or unknown-type operational deficiency	10	(1.6%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Unclassified or unknown-misuse of material	10	(1.4%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Fuel spilled or unintentionally released	10	(1.3%)	0	(0.0%)	0	(0.0%)	$1.3	(6.3%)
Rekindled from a previous fire	10	(1.1%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Other known ignition factor	30	(5.2%)	0	(0.0%)	1	(10.5%)	$0.1	(0.4%)
Total	650	(100.0%)	6	(100.0%)	12	(100.0%)	$21.0	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Table 45A.
1999 U.S. Rail Transport Vehicle Fires, by Factor Contributing to Ignition Grouping

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Misuse of material or product	**120**	**(19.2%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.9**	**(2.9%)**
Cutting or welding too close	60	(10.5%)	0	(0.0%)	0	(0.0%)	$0.3	(1.0%)
Flammable liquid or gas spilled	10	(2.3%)	0	(0.0%)	0	(0.0%)	$0.3	(0.8%)
Unclassified or unknown-type misuse of material or product	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Abandoned or discarded material	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Heat source too close to combustible	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.3	(0.9%)
Improper container or storage	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Mechanical failure or malfunction	**190**	**(32.0%)**	**0**	**(0.0%)**	**2**	**(0.8%)**	**$3.9**	**(12.1%)**
Leak or break	90	(14.5%)	0	(0.0%)	2	(0.8%)	$1.6	(5.0%)
Unclassified or unknown-type mechanical failure or malfunction	80	(12.8%)	0	(0.0%)	0	(0.0%)	$2.2	(6.9%)
Backfire	10	(2.3%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Worn out	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Electrical failure or malfunction*	**140**	**(23.8%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$4.0**	**(12.3%)**
Unspecified short circuit arc*	70	(11.6%)	0	(0.0%)	0	(0.0%)	$1.1	(3.5%)
Unclassified or unknown-type electrical failure or malfunction*	40	(6.4%)	0	(0.0%)	0	(0.0%)	$2.5	(7.9%)
Short circuit arc from defective or worn insulation*	20	(2.9%)	0	(0.0%)	0	(0.0%)	$0.2	(0.6%)
Arc from faulty contact or broken conductor*	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.2%)
Design, manufacture or installation deficiency	**0**	**(0.6%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.0**	**(0.0%)**
Operational deficiency	**30**	**(5.8%)**	**2**	**(7.7%)**	**0**	**(0.0%)**	**$19.1**	**(59.4%)**
Collision, knock down, run over or overturn	20	(2.9%)	2	(7.7%)	0	(0.0%)	$18.1	(56.4%)
Unclassified or unknown-type operational deficiency	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Overloaded equipment	10	(1.2%)	0	(0.0%)	0	(0.0%)	$1.0	(3.0%)
Natural condition	**20**	**(3.5%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.1**	**(0.3%)**
Fire spread or control	**20**	**(4.1%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$3.3**	**(10.3%)**
Exposure to other fire	20	(2.9%)	0	(0.0%)	0	(0.0%)	$3.3	(10.3%)
Rekindle	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Unclassified factor contributed	**30**	**(4.7%)**	**19**	**(84.6%)**	**292**	**(99.2%)**	**$1.9**	**(5.8%)**
None	**20**	**(3.5%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.0**	**(0.0%)**
Not reported (Captured under Broad Cause or Human Factor)	**110**	**(18.0%)**	**2**	**(7.7%)**	**0**	**(0.0%)**		
Total	**600**	**(100.0%)**	**22**	**(100.0%)**	**294**	**(100.0%)**	**$32.1**	**(100.0%)**

* Conversion rules for data originally collected in Version 4.1 of NFIRS make double-counting common.

Table 45A.
1999 U.S. Rail Transport Vehicle Fires, by Factor Contributing to Ignition Grouping
(Continued)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors, or because in Version 5.0 of NFIRS, more than one factor contributing to ignition could be entered. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the factor contributing to ignition was undetermined were allocated proportionally among fires with known factor contributing to ignition.

Source: NFIRS and NFPA survey.

Table 45B. U.S. Rail Transport Vehicle Fires, by Ignition Factor Grouping
1994-1998 Annual Averages

Ignition Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Mechanical or electrical failure	**290**	**(44.0%)**	**0**	**(0.0%)**	**2**	**(18.3%)**	**$8.0**	**(38.4%)**
Part failure, leak or break	110	(16.5%)	0	(0.0%)	0	(0.0%)	$4.8	(23.0%)
Short circuit or ground fault	60	(9.1%)	0	(0.0%)	1	(6.6%)	$2.0	(9.6%)
Other electrical failure	30	(4.4%)	0	(0.0%)	1	(5.0%)	$0.3	(1.3%)
Lack of maintenance	30	(3.9%)	0	(0.0%)	1	(6.7%)	$0.2	(1.1%)
Backfire	10	(1.6%)	0	(0.0%)	0	(0.0%)	$0.2	(0.8%)
Unclassified or unknown-type mechanical failure or malfunction	50	(8.2%)	0	(0.0%)	0	(0.0%)	$0.5	(2.6%)
Incendiary or suspicious	**120**	**(18.2%)**	**0**	**(0.0%)**	**1**	**(11.9%)**	**$1.4**	**(6.6%)**
Misuse of heat of ignition	**90**	**(14.2%)**	**0**	**(0.0%)**	**1**	**(10.5%)**	**$0.2**	**(0.9%)**
Cutting or welding too close	60	(9.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.4%)
Abandoned material	10	(1.8%)	0	(0.0%)	0	(0.0%)	$0.1	(0.3%)
Unclassified or unknown-type	10	(1.4%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Operational deficiency	**70**	**(10.8%)**	**4**	**(69.1%)**	**5**	**(46.0%)**	**$8.7**	**(41.3%)**
Spontaneous heating	40	(5.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.6%)
Collision or overturn	10	(2.1%)	4	(0.0%)	5	(46.0%)	$8.5	(40.6%)
Unclassified or unknown-type operational deficiency	10	(1.6%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Misuse of material ignited	**40**	**(5.8%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$1.4**	**(6.5%)**
Combustible too close to heat	20	(2.9%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Fuel spilled or unintentionally released	10	(1.3%)	0	(0.0%)	0	(0.0%)	$1.3	(6.3%)
Design, construction or installation deficiency	**10**	**(2.1%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.1**	**(0.6%)**
Property too close to	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.6%)
Natural condition	**0**	**(0.2%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.0**	**(0.0%)**
Other ignition factor	**30**	**(4.7%)**	**2**	**(30.9%)**	**2**	**(13.3%)**	**$1.2**	**(5.7%)**
Unclassified ignition factor	20	(3.6%)	2	(30.9%)	2	(13.3%)	$1.2	(5.7%)
Rekindled from previous fire	10	(1.1%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Total	**650**	**(100.0%)**	**6**	**(100.0%)**	**12**	**(100.0%)**	**$21.0**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Table 46A.
1999 U.S. Rail Transport Vehicle Fires, by Area of Fire Origin

Area of Fire Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine area, running gear or wheel area	210	(35.5%)	0	(0.0%)	0	(0.0%)	$7.5	(23.4%)
Cargo or trunk area	100	(16.7%)	0	(0.0%)	0	(0.0%)	$0.8	(2.6%)
Unclassified vehicle area	60	(9.4%)	0	(0.0%)	2	(0.8%)	$11.4	(35.7%)
Exterior, exposed vehicle surface	50	(8.4%)	0	(0.0%)	0	(0.0%)	$3.8	(11.8%)
Operator and passenger area (combination area)	40	(6.4%)	19	(84.6%)	292	(99.2%)	$0.4	(1.2%)
On or near railroad right of way	30	(4.9%)	0	(0.0%)	0	(0.0%)	$5.6	(17.5%)
Fuel tank or fuel line	10	(2.0%)	2	(7.7%)	0	(0.0%)	$0.0	(0.0%)
Separate operator or control area	10	(2.0%)	0	(0.0%)	0	(0.0%)	$0.1	(0.2%)
Unclassified area of origin	10	(1.5%)	0	(0.0%)	0	(0.0%)	$0.4	(1.3%)
Unclassified storage area	10	(1.5%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Storage room, area, tank or bin	10	(1.5%)	0	(0.0%)	0	(0.0%)	$0.6	(1.8%)
On or near highway, parking lot or street	10	(1.5%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Exterior stairway, ramp, or fire escape	10	(1.0%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Maintenance shop or area, paint shop or area	10	(1.0%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Other known area	40	(6.9%)	2	(7.7%)	0	(0.0%)	$1.4	(4.5%)
Total	600	(100.0%)	22	(100.0%)	294	(100.0%)	$32.1	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the area or origin was unknown or not reported were allocated proportionally among fires with known area of origin.

Source: NFIRS and NFPA survey.

Table 46B.
U.S. Rail Transport Vehicle Fires, by Area of Fire Origin
1994-1998 Annual Averages

Area of Fire Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine, running gear or wheel area of vehicle	250	(38.5%)	1	(25.5%)	8	(65.8%)	$9.4	(44.8%)
Trunk or load carrying area of vehicle	120	(18.7%)	0	(0.0%)	0	(0.0%)	$1.1	(5.2%)
Unclassified vehicle area	60	(9.4%)	0	(0.0%)	0	(3.3%)	$1.3	(6.3%)
Railroad right of way or embankment	50	(7.3%)	4	(69.0%)	1	(9.8%)	$3.9	(18.7%)
Passenger area	30	(5.0%)	0	(5.5%)	1	(7.6%)	$1.5	(7.2%)
Exterior surface of vehicle	30	(4.7%)	0	(0.0%)	1	(6.9%)	$0.1	(0.6%)
Operating or control area of vehicle	20	(3.0%)	0	(0.0%)	0	(3.5%)	$0.8	(3.7%)
Unclassified area of origin	20	(2.5%)	0	(0.0%)	0	(0.0%)	$1.0	(4.9%)
Fuel tank or fuel line of vehicle	10	(1.7%)	0	(0.0%)	0	(3.1%)	$1.2	(5.6%)
Product storage area, tank or bin	10	(1.4%)	0	(0.0%)	0	(0.0%)	$0.2	(1.0%)
Other known area	50	(8.0%)	0	(0.0%)	0	(0.0%)	$0.4	(1.9%)
Total	650	(100.0%)	6	(100.0%)	12	(100.0%)	$21.0	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the area or origin was unknown or not reported were allocated proportionally among fires with known area of origin..

Source: NFIRS and NFPA survey.

Table 47A.
1999 U.S. Rail Transport Vehicle Fires, by Item First Ignited

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified item first ignited	120	(19.4%)	0	(0.0%)	0	(0.0%)	$3.0	(9.3%)
Electrical wire or cable insulation	100	(16.4%)	0	(0.0%)	0	(0.0%)	$1.3	(4.0%)
Flammable liquid or gas in or from final container	90	(14.5%)	11	(50.0%)	0	(0.0%)	$12.4	(38.6%)
Multiple items first ignited	50	(8.5%)	0	(0.0%)	0	(0.0%)	$3.6	(11.2%)
Flammable liquid or gas in container or pipe	30	(4.8%)	0	(0.0%)	294	(100.0%)	$0.1	(0.2%)
Rubbish, trash or waste	30	(4.2%)	0	(0.0%)	0	(0.0%)	$0.2	(0.5%)
Floor covering, rug, carpet or mat	20	(3.6%)	0	(0.0%)	0	(0.0%)	$0.5	(1.4%)
Upholstered sofa, chair or vehicle seat	20	(3.0%)	11	(50.0%)	0	(0.0%)	$0.2	(0.8%)
Baled goods or material	20	(3.0%)	0	(0.0%)	0	(0.0%)	$2.3	(7.2%)
Agricultural crop, including fruits and vegetables	20	(3.0%)	0	(0.0%)	0	(0.0%)	$0.4	(1.2%)
Unclassified or unknown-type structural component or finish	10	(2.4%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Rolled or wound material including paper or fabric	10	(2.4%)	0	(0.0%)	0	(0.0%)	$0.5	(1.7%)
Interior wall covering excluding drapes	10	(1.8%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Empty pallet or skid	10	(1.8%)	0	(0.0%)	0	(0.0%)	$0.1	(0.3%)
Bulk storage	10	(1.8%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Box, carton, bag, basket or barrel	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Palletized material or material stored on pallets	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.8	(2.5%)
Other known item	40	(6.7%)	0	(0.0%)	0	(0.0%)	$6.7	(20.9%)
Total	600	(100.0%)	22	(100.0%)	294	(100.0%)	$32.1	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the item first ignited was unknown or not reported were allocated proportionally among fires with known item first ignited.

Source: National estimates based on NFIRS and NFPA survey.

Table 47B.
U.S. Rail Transport Vehicle Fires, by Form of Material First Ignited
1994-1998 Annual Averages

Form of Material	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Fuel	120	(17.7%)	4	(62.6%)	3	(28.5%)	$11.1	(53.0%)
Unclassified or unknown-type other material*	100	(15.0%)	0	(0.0%)	1	(9.8%)	$2.4	(11.4%)
Electrical wire or cable insulation	70	(11.1%)	0	(0.0%)	1	(4.3%)	$1.2	(5.5%)
Rubbish, trash or waste	50	(7.4%)	0	(0.0%)	0	(0.0%)	$0.1	(0.5%)
Structural member or framing	30	(4.2%)	0	(0.0%)	0	(0.0%)	$0.1	(0.7%)
Unclassified or unknown-type power transfer equipment or fuel	30	(4.2%)	0	(0.0%)	0	(3.3%)	$1.6	(7.6%)
Floor covering or surface	30	(4.0%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Multiple forms of material	30	(3.9%)	0	(6.4%)	4	(31.1%)	$1.5	(7.2%)
Bulk storage	20	(2.7%)	0	(0.0%)	0	(0.0%)	$0.6	(3.0%)
Accelerant, gas or liquid in or from a pipe or container	20	(2.3%)	1	(25.5%)	1	(8.7%)	$0.0	(0.2%)
Interior wall covering	10	(2.3%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Box, carton or bag	10	(2.0%)	0	(0.0%)	1	(6.9%)	$0.1	(0.5%)
Magazine, newspaper or writing paper	10	(1.8%)	0	(0.0%)	1	(4.3%)	$0.1	(0.5%)
Agricultural product	10	(1.8%)	0	(0.0%)	0	(0.0%)	$0.4	(2.1%)
Bale storage	10	(1.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.4%)
Chips	10	(1.6%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Upholstered seat	10	(1.5%)	0	(0.0%)	0	(0.0%)	$0.1	(0.5%)
Packing or wrapping material	10	(1.4%)	0	(0.0%)	0	(0.0%)	$0.0	(0.2%)
Thermal or acoustical insulation	10	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.2%)
Exterior sidewall covering or finish	10	(1.1%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Rolled material	10	(1.0%)	0	(0.0%)	0	(0.0%)	$0.2	(1.0%)
Other known form	70	(10.0%)	0	(5.5%)	0	(3.1%)	$1.1	(5.3%)
Total	650	(100.0%)	6	(100.0%)	12	(100.0%)	$21.0	(100.0%)

*Unclassified or unknown-type other form includes code 99, "Unclassified form of material," and code 90, an unassigned code in the "Other form of material" category.
Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the form of material first ignited was unknown or not reported were allocated proportionally among fires with known form of material first ignited.
Source: National estimates based on NFIRS and NFPA survey.

Table 48.
U.S. Rail Transport Vehicle Fires, by Type of Material First Ignited
1994-1998 Annual Averages

Type of Material	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wood or paper	**200**	**(30.7%)**	**0**	**(0.0%)**	**1**	**(6.9%)**	**$2.3**	**(11.1%)**
Sawn wood	80	(11.8%)	0	(0.0%)	0	(0.0%)	$0.5	(2.6%)
Untreated or uncoated paper	50	(7.5%)	0	(0.0%)	0	(0.0%)	$1.1	(5.1%)
Cardboard	20	(3.2%)	0	(0.0%)	1	(6.9%)	$0.4	(2.1%)
Hardboard or plywood	20	(2.4%)	0	(0.0%)	0	(0.0%)	$0.1	(0.5%)
Wood shavings	10	(1.6%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Unclassified or unknown-type wood or paper	20	(3.6%)	0	(0.0%)	0	(0.0%)	$0.2	(0.7%)
Flammable or combustible liquid	**130**	**(19.2%)**	**5**	**(88.2%)**	**5**	**(40.3%)**	**$12.6**	**(60.0%)**
Class II combustible liquid	50	(7.8%)	5	(81.8%)	4	(37.2%)	$10.5	(50.0%)
Gasoline	30	(4.2%)	0	(6.4%)	0	(3.1%)	$0.4	(1.7%)
Class IIIB combustible liquid	20	(3.1%)	0	(0.0%)	0	(0.0%)	$0.7	(3.1%)
Unclassified o unknown-type flammable or combustible liquid	20	(2.8%)	0	(0.0%)	0	(0.0%)	$0.6	(2.8%)
Natural product	**100**	**(15.6%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$1.2**	**(5.5%)**
Coal, coke, briquettes or peat	40	(6.8%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Rubber	30	(4.5%)	0	(0.0%)	0	(0.0%)	$1.0	(4.9%)
Grass, leaves, hay or straw	10	(1.6%)	0	(0.0%)	0	(0.0%)	$0.0	(0.2%)
Grain or natural fiber	10	(1.4%)	0	(0.0%)	0	(0.0%)	$0.0	(0.2%)
Unclassified or unknown-type natural product	10	(1.0%)	0	(0.0%)	0	(0.0%)	$0.0	(0.2%)
Plastic	**60**	**(9.0%)**	**0**	**(0.0%)**	**1**	**(4.3%)**	**$0.5**	**(2.5%)**
Polyvinyl	10	(1.8%)	0	(0.0%)	0	(0.0%)	$0.2	(1.2%)
Unclassified or unknown-type plastic	30	(4.8%)	0	(0.0%)	0	(0.0%)	$0.2	(1.2%)
Volatile solid or chemical	**40**	**(5.9%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.2**	**(1.0%)**
Grease (nonfood)	20	(3.6%)	0	(0.0%)	0	(0.0%)	$0.1	(0.6%)
Adhesive, resin or tar	10	(1.1%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Material compounded with oil	**20**	**(3.0%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.8**	**(3.8%)**
Unclassified or unknown-type material compounded with oil	20	(2.4%)	0	(0.0%)	0	(0.0%)	$0.6	(3.0%)
Fabric, textile or fur	**20**	**(2.5%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.1**	**(0.5%)**
Cotton, rayon or cotton fabric	10	(1.1%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Manufactured fabric of fiber	10	(1.1%)	0	(0.0%)	0	(0.0%)	$0.1	(0.4%)
Gas	**10**	**(1.1%)**	**0**	**(0.0%)**	**0**	**(3.1%)**	**$0.5**	**(2.4%)**
Other type of material	**80**	**(12.9%)**	**1**	**(11.8%)**	**5**	**(45.5%)**	**$2.8**	**(13.2%)**
Unclassified type of material	50	(8.3%)	0	(0.0%)	1	(10.0%)	$1.2	(5.7%)
Multiple types of material	30	(4.1%)	1	(11.8%)	4	(35.5%)	$1.5	(7.4%)
Total	**650**	**(100.0%)**	**6**	**(100.0%)**	**12**	**(100.0%)**	**$21.0**	**(100.0%)**

Table 48.
U.S. Rail Transport Vehicle Fires, by Type of Material First Ignited
1994-1998 Annual Averages
(Continued)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the type of material first ignited was unknown or not reported were allocated proportionally among fires with known type of material first ignited.

Source: NFIRS and NFPA survey.

U.S. Air Transport Vehicle Fire Problem, 1994-1998

An estimated 172 air transport vehicle fires were reported in 1999.
During 1999, an estimated 172 rail transport vehicle fires were reported to U.S. fire departments. These fires caused an estimated 15 civilian deaths and $3,300,000 in direct property damage. No civilian injuries were captured in the national estimate. Reported air transport vehicle fires rose 3% from 167 in 1998 to 172 in 1999. From 1980, the first year NFPA began tracking with current methods, to 1999, air transport vehicle fires fell 61%. (See Table 49.)

During the five-year period from 1994 through 1998, an average of 203 aircraft fires were reported per year. These fires caused an average of 38 civilian deaths, 25 civilian injuries and $39,700,000 in direct property damage annually.

These figures reflect estimates of air transport vehicle fires reported to U.S. fire departments based on data provided to the National Fire Incident Reporting System (NFIRS) and scaling ratios derived from the NFPA annual survey. They do not include fires handled by fire brigades or fires outside of the jurisdiction of a local fire department. Casualty statistics can be skewed by the inclusion or absence of one significant fire. For example, it appears that the 1996 fiery plane crash in the Florida everglades was not included in NFIRS. This crash claimed 110 lives.

If fire occurred, the risk of death was higher in aircraft than in other vehicles.
In 1999, air transport vehicles accounted for less than 0.1% of the 369,090 reported vehicle fires, 3.3% of the 469 vehicle fire deaths, none of the 1,846 civilian injuries, and 0.2% of the $1,323,200,000 in direct property damage.

During 1994-1998, the 203 air transport vehicle fires accounted for 0.1% of the 399,940 motor vehicle fires, 6.5% of the 586 vehicle fire deaths, 1.1% of the 2,346 vehicle fire injuries and 3.2% of the $1,240,700,000 in direct property damage caused by vehicle fires per year. (See Table 2.) Although these fires represent a very small share of the total vehicle fire problem, the risk of death per reported fire was much greater than that found in any other type of vehicle.

Table 50 shows that personal, business or utility aircraft under 12,500 pounds gross weight were involved in 48-49% of the reported air transport vehicle fires. This table also details the other types of vehicles included in the aircraft category.

Aircraft fires were more common between 9:00 a.m. and 9:00 p.m.
The patterns of air transport vehicle fires by month, day of week and time of day are displayed in Tables 51, 52, and 53. No clear pattern can be seen for month or day of the week. Air transport vehicle fires were more common between 9:00 a.m. and 9:00 p.m.

Air transport vehicle fires occurred on or in a variety of properties.
Table 54 shows that one-fifth (21%) of the reported air transport vehicle fires occurred on taxiways or in uncovered aircraft parking areas or maintenance areas; 16% were on runways; and 11-13% occurred on open lands or in fields.

Collisions cause a larger share of the fires in aircraft than in other vehicles.
The causes of aircraft fires are shown in Table 55 and 56. The aircraft category was the only vehicle category in which collisions and overturns was a leading cause (13-24%) of reported fires. In other vehicle classes, this cause typically accounts for a small percentage of fires but a large percentage of deaths and injuries. Forty-four to seventy-six percent of the aircraft fire deaths resulted from collisions. Aircraft fires have a very distinctive casualty pattern. In most vehicles, more injuries than deaths result from fires, but aircraft fires resulted in more deaths than injuries. In aircraft crash-fires, multiple-casualty incidents would be expected to dominate. This makes the methods used for statistical estimation from samples less reliable. Patterns other than those for fire incidents should be considered subject to significant variability.

More than half (53-58%) of the aircraft fires were caused by a failure of equipment or heat source or some type of mechanical or electrical failure. Only three percent of the air transport vehicle fires in 1994-1998 were incendiary or suspicious. No intentional aircraft fires were reported in 1999.

Roughly half of the aircraft fires began in the engine, running gear or wheel area.
Table 57 shows that 44-59% of fires in aircraft began in the engine, running gear, or wheel area. The second leading area of origin was the fuel tank or fuel line area, with 7-16% of the fires and 22-25% of the air transport vehicle fire deaths.

Fuel was the leading item first ignited in aircraft fires.
Fuel or flammable liquids or gas in or from its final container was the leading item or form of material first ignited in both time periods. (See Table 58.)

Due to changes in the coding rules for Version 5.0 of NFIRS, the type of material first ignited is shown for the 1994-1998 period only. Table 59 shows that some form of flammable or combustible liquid was the type of material first ignited in three-fifths (59%) of the aircraft fires accounting for 81% of the civilian deaths and 90% of the civilian injuries. Gasoline ranked first among the specific types ignited. Class IB flammable liquids, which include jet fuel, ranked second in this group and in overall frequency.

***Fire Protection Handbook's* chapter "Aviation" has more information.**
The chapter "Aviation," revised by Thomas J. Lett in the nineteenth edition of the *NFPA Fire Protection Handbook*, provides information on fire safety in aircraft and airports. A bibliography is included.

Reports of the U.S. National Transportation Safety Board's (NTSB's) recent investigations into aviation accidents, including fires, are available on-line at http://www.ntsb.gov/Publictn/A_Acc1.htm

Table 49.
U.S. Air Transport Vehicle Fire Problem,
by Year: 1980-1999

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)	Loss in 1999 Dollars
1980	437	72	81	$79.5	$160.9
1981	407	100	42	$31.6	$57.9
1982	415	88	24	$7.8	$13.4
1983	384	71	23	$10.4	$17.4
1984	365	54	33	$13.5	$21.6
1985	360	90	40	$13.0	$20.0
1986	348	77	37	$4.9	$7.5
1987	304	55	26	$28.1	$41.2
1988	338	75	29	$22.6	$31.9
1989	250	90	54	$32.7	$44.0
1990	295	48	28	$11.1	$14.2
1991	239	91	163	$38.6	$47.2
1992	246	91	23	$18.9	$22.4
1993	273	28	13	$90.4	$104.2
1994	215	69	34	$13.7	$15.5
1995	212	30	73	$8.5	$9.3
1996	196	31*	10	$153.2	$162.9
1997	225	22	0	$9.5	$9.9
1998	167	37	8	$13.4	$13.7
1980-1998 Annual average	299	64	39	$31.7	$42.9
1994-1998 Annual average	203	38	25	$39.7	$42.3
1999*	172	15	0	$3.3	$3.3

* Does not include the May 11, 1996 plane crash in the Florida everglades that claimed 110 lives.

* NFIRS data for 1999 was received in the Version 5.0 format involves enough coding changes that it can better be analyzed separately from data from previous years. .

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation.

Source: NFIRS and NFPA survey, "Purchasing Power of the Dollar" custom table from Bureau of Labor Statistics at http://www.bls.gov/cpi/.

Table 50A.
1999 U.S. Air Transport Vehicle Fire Problem, by Type of Vehicle

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Personal aircraft under 12,500 pounds gross weight	85	(49.2%)	14	(88.9%)	0	(NA)	$2.3	(68.3%)
Commercial fixed wing jet	31	(18.0%)	0	(0.0%)	0	(NA)	$0.1	(2.0%)
Commercial fixed wing propeller plane	11	(6.6%)	0	(0.0%)	0	(NA)	$0.0	(0.1%)
Personal aircraft of at least 12,500 pounds gross weight	8	(4.9%)	0	(0.0%)	0	(NA)	$0.9	(26.0%)
Military non-fixed wing aircraft	8	(4.9%)	0	(0.0%)	0	(NA)	$0.0	(0.3%)
Military fixed wing aircraft	3	(1.6%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Unclassified or unknown-type air transport vehicle	25	(14.8%)	2	(11.1%)	0	(NA)	$0.1	(3.4%)
Total	172	(100.0%)	15	(100.0%)	0	(NA)	$3.3	(100.0%)

NA - Not applicable.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 50B.
U.S. Air Transport Vehicle Fire Problem, by Type of Vehicle
1994-1998 Annual Averages

Vehicle Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Personnel, business or utility aircraft under 12,500 pounds gross weight	98	(48.3%)	19	(50.8%)	5	(21.0%)	$3.6	(9.1%)
Commercial transport aircraft, jet and turbine powered, fixed wing	32	(15.6%)	2	(4.2%)	2	(8.9%)	$5.3	(13.4%)
Personnel, business or utility aircraft over 12,500 pounds gross weight	13	(6.2%)	7	(17.8%)	1	(3.2%)	$9.7	(24.4%)
Non-combat type military aircraft	11	(5.4%)	1	(3.7%)	11	(44.4%)	$0.7	(1.8%)
Commercial transport aircraft reciprocating engine powered, fixed wing	8	(4.0%)	4	(9.9%)	2	(8.1%)	$0.1	(0.2%)
Non-military type helicopter or vertical take-off aircraft	8	(3.8%)	0	(1.0%)	2	(7.3%)	$1.2	(3.0%)
Combat-type military aircraft	5	(2.4%)	1	(2.1%)	0	(0.0%)	$18.2	(46.0%)
Non-military ground effect machine (hovercraft)	1	(0.7%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Unclassified or unknown-type aircraft	28	(13.6%)	4	(10.5%)	2	(7.3%)	$0.9	(2.2%)
Total	203	(100.0%)	38	(100.0%)	25	(100.0%)	$39.7	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 51A.
1999 U.S. Air Transport Vehicle Fires, by Month

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	14	(8.2%)	0	(0.0%)	0	(NA)	$0.0	(1.4%)
February	8	(4.9%)	0	(0.0%)	0	(NA)	$0.0	(0.9%)
March	23	(13.1%)	0	(0.0%)	0	(NA)	$0.4	(13.2%)
April	11	(6.6%)	0	(0.0%)	0	(NA)	$0.9	(25.8%)
May	14	(8.2%)	2	(11.1%)	0	(NA)	$0.3	(8.4%)
June	17	(9.8%)	0	(0.0%)	0	(NA)	$0.4	(13.2%)
July	8	(4.9%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
August	23	(13.1%)	9	(55.6%)	0	(NA)	$0.5	(14.4%)
September	17	(9.8%)	3	(22.2%)	0	(NA)	$0.5	(14.8%)
October	14	(8.2%)	0	(0.0%)	0	(NA)	$0.1	(3.1%)
November	11	(6.6%)	2	(11.1%)	0	(NA)	$0.1	(4.4%)
December	11	(6.6%)	0	(0.0%)	0	(NA)	$0.0	(0.3%)
Total	172	(100.0%)	15	(100.0%)	0	(NA)	$3.3	(100.0%)
Monthly average	14	(8.3%)	1	(8.3%)	0	(NA)	$0.3	(8.3%)

NA - Not applicable.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 51B.
U.S. Air Transport Vehicle Fires, by Month
1994-1998 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	18	(8.8%)	8	(22.0%)	2	(8.7%)	$0.6	(1.6%)
February	12	(5.9%)	0	(1.0%)	0	(0.0%)	$0.4	(0.9%)
March	15	(7.3%)	2	(5.8%)	0	(1.6%)	$0.7	(1.7%)
April	18	(8.8%)	6	(14.7%)	1	(3.9%)	$0.8	(2.1%)
May	14	(6.9%)	5	(12.6%)	11	(43.3%)	$4.5	(11.3%)
June	25	(12.3%)	3	(7.9%)	0	(1.6%)	$18.1	(45.5%)
July	19	(9.1%)	1	(3.1%)	0	(0.0%)	$1.0	(2.5%)
August	21	(10.2%)	2	(6.3%)	3	(10.2%)	$2.3	(5.7%)
September	15	(7.3%)	2	(4.2%)	1	(5.5%)	$1.1	(2.7%)
October	16	(8.0%)	3	(7.9%)	3	(13.4%)	$9.4	(23.7%)
November	17	(8.2%)	2	(6.3%)	2	(9.4%)	$0.2	(0.6%)
December	14	(7.1%)	3	(8.4%)	1	(2.4%)	$0.6	(1.6%)
Total	203	(100.0%)	38	(100.0%)	25	(100.0%)	$39.7	(100.0%)
Monthly average	17	(8.3%)	3	(8.3%)	2	(8.3%)	$3.3	(8.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 52A.
1999 U.S. Air Transport Vehicle Fires, by Day of Week

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	20	(11.5%)	3	(22.2%)	0	(NA)	$0.2	(6.0%)
Monday	23	(13.1%)	0	(0.0%)	0	(NA)	$0.4	(12.0%)
Tuesday	25	(14.8%)	0	(0.0%)	0	(NA)	$1.1	(33.6%)
Wednesday	25	(14.8%)	0	(0.0%)	0	(NA)	$0.2	(7.4%)
Thursday	25	(14.8%)	7	(44.4%)	0	(NA)	$0.8	(25.1%)
Friday	17	(9.8%)	0	(0.0%)	0	(NA)	$0.0	(0.3%)
Saturday	37	(21.3%)	5	(33.3%)	0	(NA)	$0.5	(15.6%)
Total	172	(100.0%)	15	(100.0%)	0	(NA)	$3.3	(100.0%)
Daily average	25	(14.3%)	2	(14.3%)	0	(NA)	$0.5	(14.3%)

NA - Not applicable.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the day of week was unknown or not reported have been allocated proportionally among fires with known day of week.

Source: NFIRS and NFPA survey.

Table 52B.
U.S. Air Transport Vehicle Fires, by Day of Week
1994-1998 Annual Averages

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	22	(10.9%)	3	(8.5%)	2	(7.1%)	$0.9	(2.3%)
Monday	26	(12.9%)	3	(9.1%)	1	(4.7%)	$0.8	(2.1%)
Tuesday	34	(16.9%)	7	(18.2%)	2	(6.1%)	$3.3	(8.2%)
Wednesday	28	(14.0%)	10	(26.0%)	16	(62.1%)	$21.2	(53.3%)
Thursday	22	(11.1%)	4	(9.6%)	0	(0.0%)	$4.7	(11.8%)
Friday	37	(18.1%)	3	(8.2%)	3	(10.2%)	$7.3	(18.3%)
Saturday	33	(16.2%)	8	(20.3%)	2	(9.9%)	$1.5	(3.9%)
Total	203	(100.0%)	38	(100.0%)	25	(100.0%)	$39.7	(100.0%)
Daily average	29	(14.3%)	5	(14.3%)	4	(14.3%)	$5.7	(14.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the day of week was unknown or not reported have been allocated proportionally among fires with known day of week.

Source: NFIRS and NFPA survey.

Table 53A.
1999 U.S. Air Transport Vehicle Fires, by Time of Day

Time of Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
12:01 - 3:00 a.m.	11	(6.6%)	0	(0.0%)	0	(NA)	$0.0	(1.4%)
3:01 - 6:00 a.m.	0	(0.0%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
6:01 - 9:00 a.m.	25	(14.8%)	0	(0.0%)	0	(NA)	$1.0	(28.8%)
9:01 - Noon	31	(18.0%)	5	(33.3%)	0	(NA)	$0.4	(12.3%)
12:01 - 3:00 p.m.	37	(21.3%)	0	(0.0%)	0	(NA)	$0.5	(15.0%)
3:01 - 6:00 p.m.	28	(16.4%)	2	(11.1%)	0	(NA)	$0.0	(0.8%)
6:01 - 9:00 p.m.	31	(18.0%)	2	(11.1%)	0	(NA)	$0.9	(27.0%)
9:01 - Midnight	8	(4.9%)	7	(44.4%)	0	(NA)	$0.5	(14.7%)
Total	172	(100.0%)	15	(100.0%)	0	(NA)	$3.3	(100.0%)
Average	22	(12.5%)	2	(12.5%)	0	(NA)	$0.4	(12.5%)

NA - Not applicable.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 53B.
U.S. Air Transport Vehicle Fires, by Time of Day
1994-1998 Annual Averages

Time of Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
12:01 - 3:00 a.m.	4	(1.9%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
3:01 - 6:00 a.m.	8	(3.9%)	0	(0.0%)	0	(0.0%)	$0.1	(0.2%)
6:01 - 9:00 a.m.	28	(13.8%)	7	(18.3%)	1	(3.2%)	$4.5	(11.2%)
9:01 - Noon	36	(17.8%)	4	(9.4%)	12	(46.0%)	$7.9	(19.8%)
12:01 - 3:00 p.m.	42	(20.5%)	9	(24.6%)	6	(22.2%)	$23.9	(60.1%)
3:01 - 6:00 p.m.	39	(19.0%)	4	(11.0%)	2	(7.9%)	$2.0	(5.0%)
6:01 - 9:00 p.m.	33	(16.4%)	10	(25.1%)	2	(7.1%)	$1.1	(2.8%)
9:01 - Midnight	14	(6.7%)	4	(11.5%)	3	(13.5%)	$0.3	(0.8%)
Total	203	(100.0%)	38	(100.0%)	25	(100.0%)	$39.7	(100.0%)
Average	25	(12.5%)	5	(12.5%)	3	(12.5%)	$5.0	(12.5%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages.

Source: NFIRS and NFPA survey.

Table 54A.
1999 U.S. Air Transport Vehicle Fires, by Fixed Property Use

Fixed Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Aircraft taxi-way	37	(21.3%)	0	(0.0%)	0	(NA)	$0.4	(11.7%)
Aircraft runway	28	(16.4%)	0	(0.0%)	0	(NA)	$0.6	(17.6%)
Open land or field	23	(13.1%)	10	(66.7%)	0	(NA)	$0.7	(19.7%)
Residential street, road or residential driveway	20	(11.5%)	0	(0.0%)	0	(NA)	$0.3	(8.6%)
Unclassified or unknown-type outdoor or special property	11	(6.6%)	2	(11.1%)	0	(NA)	$0.4	(10.9%)
Motor vehicle or boat sales, service or repair	6	(3.3%)	0	(0.0%)	0	(NA)	$0.0	(0.4%)
Livestock production	6	(3.3%)	3	(22.2%)	0	(NA)	$0.1	(3.6%)
Manufacturing or processing property	6	(3.3%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Highway or divided highway	6	(3.3%)	0	(0.0%)	0	(NA)	$0.0	(1.3%)
Vehicle parking area	6	(3.3%)	0	(0.0%)	0	(NA)	$0.0	(0.1%)
Aircraft loading area	6	(3.3%)	0	(0.0%)	0	(NA)	$0.0	(0.9%)
Airport passenger terminal	3	(1.6%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
One- or two-family dwelling	3	(1.6%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Unclassified or unknown-type vehicle storage	3	(1.6%)	0	(0.0%)	0	(NA)	$0.8	(25.2%)
Lake, river or stream	3	(1.6%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Unclassified or unknown-type property use	8	(4.9%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Total	172	(100.0%)	15	(100.0%)	0	(NA)	$3.3	(100.0%)

NA - Not applicable.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Unknowns have been allocated proportionally.

Source: NFIRS and NFPA survey.

Table 54B.
U.S. Air Transport Vehicle Fires, by Fixed Property Use
1994-1998 Annual Averages

Fixed Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
On taxiway, uncovered parking area or maintenance area	42	(20.8%)	0	(0.0%)	1	(4.7%)	$1.9	(4.8%)
On runway	32	(15.8%)	5	(13.4%)	3	(12.9%)	$4.4	(11.2%)
Open land or field	22	(11.0%)	12	(30.6%)	2	(8.0%)	$3.1	(7.9%)
Paved public street	12	(5.8%)	0	(0.8%)	1	(3.3%)	$0.2	(0.5%)
Unclassified or unknown-type aircraft areas	12	(5.7%)	2	(5.4%)	1	(2.9%)	$6.7	(17.0%)
At loading ramp	10	(5.1%)	0	(0.0%)	0	(1.5%)	$0.3	(0.7%)
One-family dwelling	6	(2.9%)	2	(5.5%)	1	(3.5%)	$11.1	(28.0%)
Unclassified or unknown-type outdoor properties	5	(2.6%)	2	(6.6%)	1	(5.2%)	$9.3	(23.4%)
Fixed property use not applicable	5	(2.6%)	2	(4.9%)	11	(42.2%)	$0.5	(1.3%)
Uncovered parking area	5	(2.4%)	0	(0.0%)	0	(0.0%)	$0.3	(0.8%)
In flight	5	(2.3%)	1	(3.7%)	0	(1.4%)	$0.2	(0.6%)
Limited access or divided highway	5	(2.2%)	1	(1.9%)	2	(7.2%)	$0.2	(0.5%)
Unclassified or unknown-type road or parking property	4	(1.9%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Aircraft hangar	3	(1.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.1%)
Forest or standing timber without logging operations	3	(1.5%)	3	(7.0%)	0	(0.0%)	$0.2	(0.6%)
Vacant lot	3	(1.4%)	4	(10.5%)	0	(0.0%)	$0.5	(1.3%)
Airport passenger terminal	3	(1.3%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Other known fixed property use	19	(9.5%)	3	(7.5%)	2	(7.2%)	$0.5	(1.0%)
Unclassified or unknown-type fixed property use	7	(3.5%)	1	(2.2%)	0	(0.0%)	$0.1	(0.2%)
Total	203	(100.0%)	38	(100.0%)	25	(100.0%)	$39.7	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Unknowns have been allocated proportionally.

Source: NFIRS and NFPA survey.

Table 55A.
1999 U.S. Air Transport Vehicle Fires, by Factor Contributing to Ignition

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Leak or break	51	(29.8%)	2	(11.1%)	0	(NA)	$0.7	(22.4%)
Collision, knock down, run over, or overturn	22	(12.8%)	7	(44.4%)	0	(NA)	$1.0	(30.0%)
Unclassified factor contributed to ignition	18	(10.6%)	0	(0.0%)	0	(NA)	$0.8	(24.3%)
Unclassified or unknown-type mechanical failure or malfunction	18	(10.6%)	0	(0.0%)	0	(NA)	$0.0	(0.9%)
Arc or spark from operating equipment*	15	(8.5%)	2	(11.1%)	0	(NA)	$0.2	(7.3%)
Flammable liquid or gas spilled	11	(6.4%)	7	(44.4%)	0	(NA)	$0.2	(5.0%)
Improper fueling technique	11	(6.4%)	0	(0.0%)	0	(NA)	$0.0	(0.1%)
Abandoned or discarded materials or products	7	(4.3%)	0	(0.0%)	0	(NA)	$0.0	(0.1%)
Worn out	7	(4.3%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Manual control failure	4	(2.1%)	0	(0.0%)	0	(NA)	$0.4	(12.1%)
Backfire	4	(2.1%)	0	(0.0%)	0	(NA)	$0.2	(5.0%)
Short circuit arc from mechanical damage*	4	(2.1%)	7	(44.4%)	0	(NA)	$0.4	(10.7%)
Unspecified short-circuit arc*	4	(2.1%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Arc from faulty contact or broken conductor*	4	(2.1%)	0	(0.0%)	0	(NA)	$0.0	(1.1%)
Unclassified or unknown-type operational deficiency	4	(2.1%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Improper startup	4	(2.1%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Exposure to other fire	4	(2.1%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Total	172	(100.0%)	15	(100.0%)	0	(NA)	$3.3	(100.0%)

NA - Not applicable.

* Conversion rules for data originally collected in Version 4.1 of NFIRS make double-counting common.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors, or because in Version 5.0 of NFIRS, more than one factor contributing to ignition could be entered. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the factor contributing to ignition was undetermined were allocated proportionally among fires with known factor contributing to ignition.

Source: NFIRS and NFPA survey.

Table 55B.
1999 U.S. Air Transport Vehicle Fires, by Broad Cause

Broad Cause	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)
Failure of equipment or heat source	92 (53.2%)	2 (11.1%)	0 (NA)	$1.3 (40.5%)
Unintentional	62 (36.2%)	14 (88.9%)	0 (NA)	$1.2 (35.2%)
Unclassified cause	18 (10.6%)	0 (0.0%)	0 (NA)	$0.8 (24.3%)
Total	172 (100.0%)	15 (100.0%)	0 (NA)	$3.3 (100.0%)

NA - Not applicable.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the broad cause was under investigation, undetermined or not reported were allocated proportionally among fires with known cause.

Source: NFIRS and NFPA survey.

Table 55C.
U.S. Air Transport Vehicle Fires, by Ignition Factor
1994-1998 Annual Averages

Ignition Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Collision or overturn	48	(23.7%)	29	(75.8%)	20	(81.9%)	$15.6	(39.2%)
Unclassified or unknown-type mechanical failure or malfunction	29	(14.5%)	3	(6.7%)	1	(3.9%)	$11.6	(29.3%)
Backfire	29	(14.1%)	0	(0.0%)	0	(0.0%)	$0.1	(0.3%)
Part failure, leak or break	28	(13.7%)	4	(10.8%)	1	(3.4%)	$1.7	(4.4%)
Short circuit or ground fault	19	(9.6%)	0	(0.0%)	0	(0.0%)	$0.1	(0.2%)
Other electrical failure	6	(3.2%)	0	(0.0%)	1	(3.6%)	$0.1	(0.2%)
Fuel spilled or unintentionally released	6	(2.9%)	0	(0.0%)	0	(0.0%)	$0.6	(1.4%)
Incendiary or suspicious	6	(2.8%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Unclassified ignition factor	5	(2.5%)	2	(5.2%)	1	(3.7%)	$9.5	(24.0%)
Unclassified or unknown-type operational deficiency	4	(2.0%)	1	(1.5%)	0	(0.0%)	$0.1	(0.2%)
Combustible too close to heat	2	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Manual control failure	2	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Lack of maintenance	2	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Other known ignition factor	16	(7.8%)	0	(0.0%)	1	(3.4%)	$0.2	(0.6%)
Total	203	(100.0%)	38	(100.0%)	25	(100.0%)	$39.7	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Table 56A.
1999 U.S. Air Transport Vehicle Fires, by Factor Contributing to Ignition Grouping

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Mechanical failure or malfunction	**84**	**(48.9%)**	**2**	**(11.1%)**	**0**	**(NA)**	**$1.3**	**(40.5%)**
Leak or break	51	(29.8%)	2	(11.1%)	0	(NA)	$0.7	(22.4%)
Unclassified or unknown-type mechanical failure or malfunction	18	(10.6%)	0	(0.0%)	0	(NA)	$0.0	(0.9%)
Worn out	7	(4.3%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Manual control failure	4	(2.1%)	0	(0.0%)	0	(NA)	$0.4	(12.1%)
Backfire	4	(2.1%)	0	(0.0%)	0	(NA)	$0.2	(5.0%)
Misuse of material or product	**29**	**(17.0%)**	**7**	**(44.4%)**	**0**	**(NA)**	**$0.2**	**(5.3%)**
Flammable liquid or gas spilled	11	(6.4%)	7	(44.4%)	0	(NA)	$0.2	(5.0%)
Improper fueling technique	11	(6.4%)	0	(0.0%)	0	(NA)	$0.0	(0.1%)
Abandoned or discarded materials	7	(4.3%)	0	(0.0%)	0	(NA)	$0.0	(0.1%)
Electrical failure or malfunction*	**26**	**(14.9%)**	**9**	**(55.6%)**	**0**	**(NA)**	**$0.6**	**(19.1%)**
Arc or spark from operating equipment*	15	(8.5%)	2	(11.1%)	0	(NA)	$0.2	(7.3%)
Short circuit arc from mechanical damage*	4	(2.1%)	7	(44.4%)	0	(NA)	$0.4	(10.7%)
Unspecified short circuit arc*	4	(2.1%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Arc from faulty contact or broken conductor*	4	(2.1%)	0	(0.0%)	0	(NA)	$0.0	(1.1%)
Operational deficiency	**29**	**(17.0%)**	**7**	**(44.4%)**	**0**	**(NA)**	**$1.0**	**(30.0%)**
Collision, knock down, run over or overturn	22	(12.8%)	7	(44.4%)	0	(NA)	$1.0	(30.0%)
Unclassified or unknown-type operational deficiency	4	(2.1%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Improper startup	4	(2.1%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Fire spread or control	**4**	**(2.1%)**	**0**	**(0.0%)**	**0**	**(NA)**	**$0.0**	**(0.0%)**
Exposure to other fire	4	(2.1%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Unclassified factor contributed	**18**	**(10.6%)**	**0**	**(0.0%)**	**0**	**(NA)**	**$0.8**	**(24.3%)**
Total	**172**	**(100.0%)**	**15**	**(100.0%)**	**0**	**(NA)**	**$3.3**	**(100.0%)**

NA - Not applicable.

* Conversion rules for data originally collected in Version 4.1 of NFIRS make double-counting common.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors, or because in Version 5.0 of NFIRS, more than one factor contributing to ignition could be entered. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the factor contributing to ignition was undetermined were allocated proportionally among fires with known factor contributing to ignition.

Source: NFIRS and NFPA survey.

Table 56B.
U.S. Air Transport Vehicle Fires, by Ignition Factor Grouping
1994-1998 Annual Averages

Ignition Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Mechanical or electrical failure	**117**	**(57.8%)**	**7**	**(17.5%)**	**3**	**(10.9%)**	**$13.7**	**(34.5%)**
Backfire	29	(14.1%)	0	(0.0%)	0	(0.0%)	$0.1	(0.3%)
Part failure, leak or break	28	(13.7%)	4	(10.8%)	1	(3.4%)	$1.7	(4.4%)
Short circuit or ground fault	19	(9.6%)	0	(0.0%)	0	(0.0%)	$0.1	(0.2%)
Other electrical failure	6	(3.2%)	0	(0.0%)	1	(3.6%)	$0.1	(0.2%)
Manual control failure	2	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Lack of maintenance	2	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Unclassified or unknown-type mechanical failure or malfunction	29	(14.5%)	3	(6.7%)	1	(3.9%)	$11.6	(29.3%)
Operational deficiency	**57**	**(28.3%)**	**29**	**(77.2%)**	**20**	**(81.9%)**	**$15.8**	**(39.9%)**
Collision or overturn	48	(23.7%)	29	(75.8%)	20	(81.9%)	$15.6	(39.2%)
Unclassified or unknown-type operational deficiency	4	(2.0%)	1	(1.5%)	0	(0.0%)	$0.1	(0.2%)
Misuse of material ignited	**11**	**(5.4%)**	**0**	**(0.0%)**	**1**	**(3.4%)**	**$0.6**	**(1.5%)**
Fuel spilled or unintentionally released	6	(2.9%)	0	(0.0%)	0	(0.0%)	$0.6	(1.4%)
Combustible too close to heat	2	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Incendiary or suspicious	**6**	**(2.8%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.0**	**(0.1%)**
Design, construction or installation deficiency	**3**	**(1.4%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.0**	**(0.0%)**
Natural condition	**2**	**(1.1%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.0**	**(0.0%)**
Misuse of heat of ignition	**1**	**(0.3%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.0**	**(0.0%)**
Other ignition factor	**6**	**(3.0%)**	**2**	**(5.2%)**	**1**	**(3.7%)**	**$9.5**	**(24.0%)**
Unclassified ignition factor	5	(2.5%)	2	(5.2%)	1	(3.7%)	$9.5	(24.0%)
Total	**203**	**(100.0%)**	**38**	**(100.0%)**	**25**	**(100.0%)**	**$39.7**	**(100.0%)**

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the ignition factor was unknown or not reported were allocated proportionally among fires with known ignition factor.

Source: NFIRS and NFPA survey.

Table 57A.
1999 U.S. Air Transport Vehicle Fires, by Area of Fire Origin

Area of Fire Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine area, running gear or wheel area	76	(44.0%)	2	(11.1%)	0	(NA)	$0.9	(28.2%)
Fuel tank or fuel line	28	(16.0%)	3	(22.2%)	0	(NA)	$0.5	(14.6%)
Operator and passenger area (combination area)	17	(10.0%)	2	(11.1%)	0	(NA)	$1.2	(37.3%)
Unclassified vehicle area	10	(6.0%)	2	(11.1%)	0	(NA)	$0.0	(0.0%)
Cargo or trunk area	10	(6.0%)	0	(0.0%)	0	(NA)	$0.0	(0.1%)
Exterior, exposed vehicle surface	10	(6.0%)	7	(44.4%)	0	(NA)	$0.3	(8.8%)
Unclassified area of origin	7	(4.0%)	0	(0.0%)	0	(NA)	$0.0	(0.1%)
Unclassified structural area	3	(2.0%)	0	(0.0%)	0	(NA)	$0.0	(0.2%)
Separate operator or control area	3	(2.0%)	0	(0.0%)	0	(NA)	$0.1	(3.3%)
Open outside area	3	(2.0%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Multiple areas	3	(2.0%)	0	(0.0%)	0	(NA)	$0.2	(7.5%)
Total	172	(100.0%)	15	(100.0%)	0	(NA)	$3.3	(0.0%)

NA - Not applicable.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the area or origin was unknown or not reported were allocated proportionally among fires with known area of origin.

Source: NFIRS and NFPA survey.

Table 57B.
U.S. Air Transport Vehicle Fires, by Area of Fire Origin
1994-1998 Annual Averages

Area of Fire Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Engine, running gear or wheel area of vehicle	120	(59.0%)	10	(27.0%)	19	(74.6%)	$7.2	(18.3%)
Fuel tank or fuel line of vehicle	15	(7.1%)	10	(25.4%)	2	(6.1%)	$13.2	(33.2%)
Unclassified vehicle area	12	(5.8%)	4	(9.8%)	0	(1.6%)	$0.4	(0.9%)
Operating or control area of vehicle	10	(4.8%)	2	(4.7%)	1	(4.7%)	$15.8	(39.8%)
Passenger area	9	(4.3%)	0	(0.0%)	0	(0.0%)	$0.6	(1.5%)
Unclassified area of origin	5	(2.6%)	0	(0.0%)	0	(0.0%)	$1.0	(2.5%)
Lawn, field or open area	5	(2.5%)	1	(3.8%)	1	(2.2%)	$0.1	(0.4%)
Exterior surface of vehicle	5	(2.4%)	1	(2.2%)	0	(0.0%)	$0.6	(1.5%)
Area of origin not applicable	4	(2.0%)	2	(4.0%)	0	(0.0%)	$0.2	(0.4%)
Trunk or load carrying area of vehicle	4	(1.8%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Wildland area or woods	3	(1.5%)	1	(3.6%)	0	(0.0%)	$0.0	(0.1%)
Unclassified structural area	2	(1.0%)	0	(0.0%)	1	(3.3%)	$0.0	(0.1%)
Other known area	10	(5.1%)	7	(19.5%)	2	(7.6%)	$0.5	(1.3%)
Total	203	(100.0%)	38	(100.0%)	25	(100.0%)	$39.7	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the area or origin was unknown or not reported were allocated proportionally among fires with known area of origin.

Source: NFIRS and NFPA survey.

Table 58A.
1999 U.S. Air Transport Vehicle Fires, by Item First Ignited

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable liquid or gas in or from final container	59	(34.2%)	6	(37.5%)	0	(NA)	$2.5	(74.8%)
Unclassified item first ignited	41	(23.7%)	2	(12.5%)	0	(NA)	$0.1	(3.2%)
Tire	27	(15.8%)	8	(50.0%)	0	(NA)	$0.5	(15.6%)
Flammable liquid or gas in container or pipe	9	(5.3%)	0	(0.0%)	0	(NA)	$0.0	(0.2%)
Electrical wire or cable insulation	9	(5.3%)	0	(0.0%)	0	(NA)	$0.2	(5.6%)
Exterior trim including doors	5	(2.6%)	0	(0.0%)	0	(NA)	$0.0	(0.5%)
Unclassified or unknown-type furniture or utensil	5	(2.6%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Luggage	5	(2.6%)	0	(0.0%)	0	(NA)	$0.0	(0.1%)
Animal	5	(2.6%)	0	(0.0%)	0	(NA)	$0.0	(0.1%)
Rubbish, trash or waste	5	(2.6%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Multiple items first ignited	5	(2.6%)	0	(0.0%)	0	(NA)	$0.0	(0.0%)
Total	172	(100.0%)	15	(100.0%)	0	(NA)	$3.3	(0.0%)

NA - Not applicable.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the item first ignited was unknown or not reported were allocated proportionally among fires with known item first ignited.

Source: NFIRS and NFPA survey.

Table 58B.
U.S. Air Transport Vehicle Fires, by Form of Material First Ignited
1994-1998 Annual Averages

Form of Material Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Fuel	99	(48.7%)	29	(77.0%)	19	(75.1%)	$36.3	(91.5%)
Electrical wire or cable insulation	24	(12.0%)	0	(0.0%)	0	(1.6%)	$0.2	(0.6%)
Unclassified form of material	18	(8.8%)	0	(0.0%)	0	(0.0%)	$1.8	(4.4%)
Accelerant, gas or liquid in or from a pipe or container	13	(6.3%)	1	(3.1%)	2	(6.9%)	$0.2	(0.5%)
Multiple forms of material	12	(5.9%)	7	(17.7%)	2	(9.1%)	$0.6	(1.6%)
Tire	8	(3.8%)	0	(0.0%)	1	(3.5%)	$0.1	(0.1%)
Unclassified or unknown-type power transfer equipment or fuel	5	(2.7%)	0	(1.1%)	0	(0.0%)	$0.1	(0.3%)
Other known form	24	(11.9%)	0	(1.1%)	1	(3.7%)	$0.4	(1.0%)
Total	203	(100.0%)	38	(100.0%)	25	(100.0%)	$39.7	(100.0%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the form of material first ignited was unknown or not reported were allocated proportionally among fires with known form of material first ignited.

Source: NFIRS and NFPA survey.

Table 59.
U.S. Air Transport Vehicle Fires, by Type of Material First Ignited
1994-1998 Annual Averages

Type of Material	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible liquid	**119**	**(58.9%)**	**31**	**(80.8%)**	**22**	**(89.7%)**	**$37.2**	**(93.7%)**
Gasoline	50	(24.6%)	10	(25.6%)	4	(15.5%)	$1.0	(2.6%)
Class IB flammable liquid	24	(11.9%)	15	(39.6%)	18	(71.9%)	$32.8	(82.8%)
Class II combustible liquid	14	(7.0%)	2	(4.8%)	0	(0.0%)	$1.6	(3.9%)
Class IA flammable liquid	10	(5.0%)	2	(5.0%)	1	(2.2%)	$0.4	(1.0%)
Class IIIB combustible liquid	3	(1.7%)	0	(0.0%)	0	(0.0%)	$0.1	(0.2%)
Unclassified or unknown-type flammable or combustible liquid	16	(7.8%)	2	(5.7%)	0	(0.0%)	$1.2	(3.1%)
Plastic	**19**	**(9.3%)**	**0**	**(0.0%)**	**1**	**(3.1%)**	**$0.1**	**(0.4%)**
Polyvinyl	4	(2.1%)	0	(0.0%)	0	(0.0%)	$0.1	(0.2%)
Unclassified or unknown-type plastic	13	(6.6%)	0	(0.0%)	1	(3.1%)	$0.0	(0.1%)
Natural product	**14**	**(6.7%)**	**0**	**(0.0%)**	**1**	**(3.5%)**	**$0.1**	**(0.4%)**
Rubber	11	(5.3%)	0	(0.0%)	1	(3.5%)	$0.1	(0.3%)
Grass, leaves, hay or straw	2	(1.2%)	0	(0.0%)	0	(0.0%)	$0.0	(0.1%)
Volatile solid or chemical	**10**	**(4.8%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.1**	**(0.3%)**
Grease (nonfood)	4	(2.0%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Combustible metal	4	(1.9%)	0	(0.0%)	0	(0.0%)	$0.1	(0.2%)
Fabric, textile or fur	**6**	**(3.2%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.0**	**(0.0%)**
Manufactured fabric or fiber	4	(1.9%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Cotton, rayon or cotton fabric	2	(0.8%)	0	(0.0%)	0	(0.0%)	$0.0	(0.0%)
Gas	**5**	**(2.5%)**	**3**	**(6.9%)**	**1**	**(2.2%)**	**$0.4**	**(0.9%)**
Unclassified or unknown-type gas	2	(1.2%)	1	(2.8%)	0	(0.0%)	$0.1	(0.2%)
Material compounded with oil	**5**	**(2.2%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.0**	**(0.0%)**
Wood or paper	**2**	**(1.1%)**	**0**	**(0.0%)**	**0**	**(0.0%)**	**$0.0**	**(0.0%)**
Other type of material	**23**	**(11.4%)**	**5**	**(12.4%)**	**0**	**(1.5%)**	**$1.7**	**(4.3%)**
Unclassified type of material	12	(5.7%)	1	(2.2%)	0	(0.0%)	$1.4	(3.5%)
Multiple types of material	11	(5.3%)	4	(10.1%)	0	(1.5%)	$0.3	(0.8%)
Total	**203**	**(100.0%)**	**38**	**(100.0%)**	**25**	**(100.0%)**	**$39.7**	**(100.0%)**

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Property damage figures are not adjusted for inflation. Percentages were calculated on the actual estimates, so two figures with the same rounded-off estimates may have different percentages. Fires in which the type of material first ignited was unknown or not reported were allocated proportionally among fires with type of material item first ignited.

Source: NFIRS and NFPA survey.

Appendix A: How National Estimates Statistics Are Calculated

Estimates are made using the National Fire Incident Reporting System (NFIRS) of the Federal Emergency Management Agency's (FEMA's) United States Fire Administration (USFA), supplemented by the annual stratified random-sample survey of fire experience conducted by the NFPA (National Fire Protection Association), which is used for calibration.

Databases Used

NFIRS provides annual computerized data bases of fire incidents, with data classified according to a standard format based on the NFPA 901 Standard. Roughly three-fourths of all states have NFIRS coordinators, who receive fire incident data from participating fire departments and combine the data into a state database. These data are then transmitted to FEMA/USFA. Participation by the states, and by local fire departments within participating states, is voluntary. NFIRS captures roughly one-third to one-half of all U.S. fires each year. More than one-third of all U.S. fire departments are listed as participants in NFIRS, although not all of these departments provide data every year.

The strength of NFIRS is that it provides the most detailed incident information of any national database not limited to large fires. NFIRS is the only database capable of addressing national patterns for fires of all sizes by specific property use and specific fire cause. (The NFPA survey separates fewer than 20 property use categories and solicits no cause-related information except for intentional fires.) NFIRS also captures information on area of origin, material first ignited and on the performance of detectors and sprinklers.

The NFPA survey is based on a stratified random sample of roughly 3,000 U.S. fire departments (or just over one of every ten fire departments in the country). The survey includes the following information: (1) the total number of fire incidents, civilian deaths, and civilian injuries, and the total estimated property damage (in dollars), for each of the major property use classes defined by the NFPA 901 Standard or Version 5.0 of NFIRS; (2) the number of on-duty firefighter injuries, by type of duty and nature of illness; and (3) information on the type of community protected (e.g., county versus township versus city) and the size of the population protected, which is used in the statistical formula for projecting national totals from sample results.

The NFPA survey begins with the NFPA Fire Service Inventory, a computerized file of about 30,000 U.S. fire departments, which is the most complete and thoroughly validated such listing in existence. The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities protect fewer people per department and are less likely to respond to the survey, so a large number must be surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size. NFPA also follows up to confirm that vehicle fire deaths actually resulted from a fire, not an injury caused by trauma.) On the other hand, large city departments are so few in number

and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

Projecting NFIRS to National Estimates

To project NFIRS results to national estimates, one needs at least an estimate of the NFIRS fires as a fraction of the total so that the fraction can be inverted and used as a multiplier or scaling ratio to generate national estimates from NFIRS data. But NFIRS is a sample from a universe whose size cannot be inferred from NFIRS alone. Also, participation rates in NFIRS are not necessarily uniform across regions and sizes of community. Both factors are correlated with frequency and severity of fires. This means NFIRS may be susceptible to systematic biases. No one at present can quantify the size of these deviations from the ideal, representative sample, so no one can say with confidence that they are or are not serious problems. But there is enough reason for concern so that a second data base - the NFPA survey - is needed to project NFIRS to national estimates and to project different parts of NFIRS separately. This multiple calibration approach makes use of the annual NFPA survey where its statistical design advantages are strongest.

There are separate projection formulas for four major property classes (residential structures, non-residential structures, vehicles, and other) and for each measure of fire severity (fire incidents, civilian deaths, and civilian injuries, and direct property damage).

For example, the scaling ratio for 1998 civilian deaths in residential structures is equal to the total number of 1998 civilian deaths in residential structure fires reported to fire departments, according to the NFPA survey (3,250), divided by the total number of 1998 civilian deaths in residential structure fires reported to NFIRS (1,224). Therefore, the scaling ratio is 3,250/1,224 = 2.66.

The scaling ratios for civilian deaths and injuries and direct property damage are often significantly different from those for fire incidents. Except for fire service injuries, average severity per fire is generally higher for NFIRS than for the NFPA survey. Use of different scaling ratios for each measure of severity is equivalent to assuming that these differences are due either to NFIRS under-reporting of small fires, resulting in a higher-than-actual loss-per-fire ratio, or possible biases in the NFIRS sample representation by region or size of community, resulting in severity-per-fire ratios characteristic only of the oversampled regions or community sizes.

Note that this approach also means that the NFPA survey results for detailed property-use classes (e.g., fires in storage structures) may not match the national estimates of the same value.

Calculating National Estimates of Particular Types of Fires

Most analyses of interest involve the calculation of the estimated number of fires not only within a particular occupancy but also of a particular type. The types that are mostly frequently of interest are those defined by some ignition-cause characteristic. The six

cause-related characteristics most commonly used to describe fires are: form of the heat or heat source that caused the ignition, equipment involved in ignition, form or item and type of material first ignited, the ignition factor or factor contributing to ignition that brought heat source and ignited material together, and area of origin. Other characteristics of interest are victim characteristics, such as ages of persons killed or injured in fire.

For any characteristic of interest in NFIRS, some reported fires have that characteristic unknown or not reported. If the unknowns are not taken into account, then the propensity to report or not report a characteristic may influence the results far more than the actual patterns on that characteristic. For example, suppose the number of fires remained the same for several consecutive years, but the percentage of fires with cause unreported steadily declined over those years. If the unknown-cause fires were ignored, it would appear as if fires due to every specific cause increased over time while total fires remained unchanged. This, of course, does not make sense.

Consequently, most national estimates analyses allocate unknowns. This is done by using scaling ratios defined by NFPA survey estimates of totals divided by only those NFIRS fires for which the dimension in question was known and reported. This approach is equivalent to assuming that the fires with unreported characteristics, if known, would show the same proportions as the fires with known characteristics. For example, it assumes that the fires with unknown ignition factor contain the same relative shares of child-playing fires, incendiary-cause fires, short circuit fires, and so forth, as are found in the fires where ignition factor was reported.

In this report, unknown days of week, areas of origin, ignition factors or factors contributing to ignition, forms or items of material first ignited, and types of material first ignited were allocated over the knowns. With the exception of the tables showing vehicle types, ignition factor or factor contributing to ignition groupings, and type of material first ignited, only those areas, ignition factors, and materials which rounded to at least 10 fires (i.e., averaged at least 5 fires a year) in all sections except the air transport fire section and had a 1% or greater share of fires were listed separately. Anything else was grouped in the “other known” category.

The tables on vehicle types include all the vehicle types in the class, even if fires of a specific type of vehicle rounded to zero. On the tables showing ignition factor groupings and types of material first ignited, the group or category heading was listed even if the number of fires rounded to less than ten or one percent. The values listed in the ignition factor group and type of material category headings add up to the total for that vehicle classification. Specific ignition factors or types of material were included in these tables only if they met the threshold cited in the previous paragraph. Consequently, the entries within an ignition or material type group often do not sum to the group total. If the unclassified and unknown-type data combination in a group met or exceeded the threshold, this value was listed after those for which the specific ignition factor or type of material was known.

Except in the aircraft section, fires were rounded off to the nearest ten, deaths and injuries were rounded off to the nearest one, and direct property damage was rounded off to the nearest hundred thousand and was not adjusted for inflation. Because of rounding errors, the five-year annual averages may differ slightly from that obtained from averages based on the fire problem by year. Because of the comparatively small number of incidents, aircraft fires were rounded to the nearest one.

Version 5.0 of NFIRS changed, added and dropped some of the codes used and some of the coding rules. Much of the former "Ignition Factor" converts to "Factor Contributing to Ignition." However, incendiary and suspicious convert to intentional in the broad cause category. Fires that had been coded as incendiary or suspicious or that resulted from one of several human factors have been removed from and left blank in "Factor Contributing to Ignition" because they are captured elsewhere. Some codes from Form of Heat of Ignition (particularly electrical codes) convert to "Factor Contributing to Ignition." Because two entries are allowed for this field, the conversion process causes some double counting of certain factors. In Version 5.0, "none" is also a valid choice for this field.

The "Type of Material First Ignited" was formerly required for all fires, but in Version 5.0 is required for only a subset of fires. Because of this change, 1999 tables for type of material were not provide. Version 5.0 also introduced three digit incident types, which in some cases, identify a class of mobile property type. However, all vehicle fires that were collected in an older version converted to "other vehicle fire." In addition, the mobile property type is no longer required if the vehicle was not involved in the ignition. In practice, it appears that fire departments are entering this information for most fires. This analysis used mobile property type to assign the vehicles to a specific property class.

No allocation of unknowns was done for mobile property type or fixed property use. Consequently, the estimated number of highway vehicles is lower in this analysis than in the estimates derived from NFPA's annual fire department survey.

Rounding Errors

The possibility of rounding errors exists in all our calculations. One of the notes on each table indicates the extent of rounding for that table, e.g., deaths rounded to the nearest one, fires rounded to the nearest hundred, property damage rounded to the nearest hundred thousand dollars. In rounding to the nearest one, functional values of 0.5 or more are rounded up and functional values less than 0.5 are rounded down. For example, 2.5 would round to 3, and 3.4 would round to 3. In rounding to the nearest one, a stated estimate of 1 could be any number from 0.5 to 1.49, a roughly threefold range.

The impact of rounding is greatest when the stated number is small relative to the degree of rounding. As noted, rounding to the nearest one means that stated values of 1 may vary by a factor of three. Similarly, the cumulative impact of rounding error - the potential gap between the estimated total and the sum of the estimated values as rounded - is greatest when there are a large number of values and the total is small relative to the extent of rounding.

Suppose a table presented 5-year averages of estimated deaths by item first ignited, all rounded to the nearest one. Suppose there were a total of 30 deaths in the 5 years, so the total average would be 30/5 = 6.

In case 1, suppose 10 of the possible items first ignited each accounted for 3 deaths in 5 years. Then there would be 10 entries of 3/5 = 0.6, rounded to 1, and the sum would be 10, compared to the true total of 6.

In case 2, suppose 15 of the possible items first ignited each accounted for 2 deaths in 5 years. Then there would be 15 entries of 215 = 0.4, rounded to 0, and the sum would be 0, compared to the true total of 6.

Here is another example: Suppose there were an estimate of 7 deaths total in 1994 through 1998. The 5-year average would be 1.4, which would round to 1, the number we would show as the total. Each death would represent a 5-year average of 0.2.

If those 7 deaths split as 4 deaths in one category (e.g., smoking) and 3 deaths in a second category (e.g., heating), then we would show 4 x 0.2 = 0.8 deaths per year for smoking and 3 x 0.2 = 0.6 deaths per year for heating. Both would round to 1, there would be two entries of 1, and the sum would be 2, higher than the actual rounded total.

If those 7 deaths split as 1 death in each of 7 categories (quite possible since there are 12 major cause categories), then we would show 0.2 in each category, always rounding to 0, and the sum would be 0, lower than the actual rounded total. The more categories there are, the farther apart the sum and total can -- and often do -- get.

Note that percentages are calculated from unrounded values, and so it is quite possible to have a percentage entry of up to 100%, even if the rounded number entry is zero.