



1997

Residential Fire

Loss Estimates

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Introduction

The attached tables present estimated product-related fire losses that occurred in U.S. residential structure fires attended by the fire service during 1997. The estimates were derived from data provided by the U.S. Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association (NFPA).

The estimates presented in the 1997 fire loss report are not comparable to those published for previous years due to two major changes in the methodology. The methodology was revised to allocate NFIRS reports having unknown Ignition Factor proportionally over the set of known Ignition Factors. Once the Ignition Factor "unknowns" were allocated, fire incidents that had an Ignition Factor of "incendiary" or "suspicious" were excluded to produce estimates for fires, deaths, injuries, and property loss that **exclude incendiary and suspicious fires**. These estimates, presented in the *Appendix Tables*, were developed to reflect those fire losses more likely to be addressable by U.S. Consumer Product Safety Commission actions.

A second change involved NFIRS reports that had sufficient information for classification into an NFIRS category (e.g., Heating Equipment), but insufficient information for classification into a specific NFIRS code (e.g., Water Heater) *within* the category. Previously, estimates corresponding to such NFIRS reports appeared under the appropriate NFIRS category as an "unknown" (e.g., Heating Equipment, Unknown). The methodology was revised to allocate these "within category unknowns" proportionally over the specific NFIRS codes within the category. As a result, estimates representing "unknowns" within a category no longer appear in the tables since "unknowns" at all levels are allocated.

In future reports, all annual fire loss estimates will represent U.S. residential structure fires excluding incendiary and suspicious fires. The impact of excluding incendiary and suspicious fires is that certain products will have consistently lower estimates than in past reports. To overcome this discrepancy, historical estimates prior to 1997 reflecting the revised methodology will be produced and made available early next year. An overview of the 1997 fire losses follows below:

- An estimated 406,500 residential structure fires were attended by fire departments in 1997. These fires resulted in an estimated 3,390 civilian deaths, 17,775 civilian injuries, and \$4.58 billion in property loss.¹ (Table 1) Estimates excluding incendiary and suspicious fires were 379,900 fires, 3,080 civilian deaths, 16,860 civilian injuries, and \$4.15 billion in property loss. (Appendix Table 1)
- All fires in residential properties, including incendiary and suspicious incidents, accounted for about 74 percent of all structure fires in 1997 and resulted in 97 percent of civilian deaths and 87 percent of civilian injuries in all structure fires.

¹ Michael J. Karter, Jr., "1997 Fire Loss in the U.S.", NFPA Journal, Sept./Oct.1998, pp. 72 - 82.

- Among products within CPSC jurisdiction (which excludes cigarettes), the products most frequently involved in all residential structure fire deaths were upholstered furniture (20%), mattresses/bedding (17%), and heating equipment (12%). The percentages were nearly identical (21%, 17%, and 13%, respectively) when incendiary and suspicious fires were excluded. Cooking equipment and electrical distribution systems, mainly home wiring and light fixtures, accounted for about 9 percent and 7 percent of all residential structure fire deaths, respectively. Similar percentages (9% and 8%, respectively) applied for deaths resulting from fires other than incendiary and suspicious. (Appendix Tables 1 and 2)
- Cooking equipment, primarily ranges and ovens, was the type of equipment most frequently involved in residential fires and injuries (26% of all fires and 29% of all injuries; 27% of fires and 30% of injuries, excluding incendiary and suspicious fires). Most cooking equipment-related fires and injuries involved electrical products (16% and 19%, respectively, for all fires; 17% and 20%, respectively, excluding incendiary and suspicious fires). Heating equipment was the second leading product type involved in fires (15% for all fires; 16% excluding incendiary and suspicious). (Table 1 and Appendix Table 1)

Fire loss estimates presented in this report are fires, deaths, injuries, and property loss associated with consumer products. Only selected product categories are presented in the attached tables; therefore, the detail of the product categories may not add to the total number of fires, deaths, injuries, and property loss that appears in the heading. Estimates labeled as “Other” under a category heading (e.g., Heating Equipment, Other) correspond to NFIRS codes that were grouped together due to their relatively low individual estimates. The product categories selected, excluding smoking material, represent products within the jurisdiction of CPSC. The methodology used for deriving the estimates is described in the *Methodology* section of this report.

TABLE 1
ESTIMATED FIRE LOSSES IN RESIDENTIAL STRUCTURES
SELECTED EQUIPMENT, 1997

Equipment	Fires	Civilian Deaths	Civilian Injuries	Property Loss (In Millions)
Total Residential	406,500	3,390	17,775	\$4,585.0
Total Heating Equipment	61,100	410	1,390	\$607.0
Fixed Heater	14,900	160	260	\$112.1
Portable Heater	5,400	130	430	\$106.8
Central Heating	10,800	20	240	\$89.0
Fireplace	7,500	20	80	\$83.6
Chimney or Connector	13,200	10	80	\$95.7
Water Heater	7,800	40	260	\$89.2
Other	1,600	30	40	\$30.6
Total Cooking Equipment	105,100	290	5,100	\$470.1
Range/Oven	92,700	260	4,560	\$348.0
Gas	25,800	120	990	\$77.8
Electric	55,600	90	3,080	\$223.7
Other	11,400	40	490	\$46.5
All Other Cooking	12,300	30	540	\$122.1
Gas	1,400	--	80	\$13.0
Electric	7,700	30	320	\$58.7
Other	3,200	--	140	\$50.4
Total Electric Distribution	40,300	250	1,360	\$687.3
Installed Wiring	14,600	110	420	\$297.2
Cord, Plug	6,300	90	320	\$113.9
Switch, Outlet	4,900	10	160	\$63.1
Lamp, Light Fixture	9,900	30	350	\$146.2
Other	4,600	10	110	\$66.9
Total Appliances (Except Above)	30,000	110	980	\$275.1
TV, Radio, Phono	2,000	20	110	\$30.5
Dryer	16,800	30	430	\$97.3
Washing Machine	1,900	--	30	\$6.0
Heat Producing Appliance	3,400	30	190	\$55.8
Non-Heat Producing Appliance	2,900	10	120	\$44.3
Other	3,000	20	100	\$41.2
Total Cooling, Air Conditioning	3,800	--	130	\$41.6

Source: U.S. Consumer Product Safety Commission / EPHA, from data obtained from the U.S. Fire Administration and NFPA.

Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10. Property loss is rounded to the nearest tenth of a million. Detail may not add to total due to rounding. Estimates less than 10 are denoted by an asterisk (*). A value of (--) indicates that no NFIRS reports were received.

TABLE 2
ESTIMATED FIRE LOSSES IN RESIDENTIAL STRUCTURES
SELECTED PRODUCTS, 1997

Product	Fires	Civilian Deaths	Civilian Injuries	Property Loss (In Millions)
Total Residential	406,500	3,390	17,775	\$4,585.0
By Form of Heat of Ignition				
Cigarette, Other Tobacco Prod.	24,800	880	2,120	\$335.1
Match	21,300	250	1,320	\$271.5
Child Play	7,100	110	800	\$120.7
Other	14,200	140	520	\$150.8
Lighter	11,800	260	1,290	\$196.4
Child Play	7,500	170	920	\$132.7
Other	4,300	90	370	\$63.6
Candle	13,600	220	1,360	\$206.1
By Form of Material First Ignited				
Upholstered Furniture	12,900	680	1,590	\$248.7
Smoking Material Ignition	5,800	460	840	\$105.4
Open Flame Ignition	3,500	100	560	\$79.8
Other	3,600	120	200	\$63.5
Mattress, Bedding	24,800	570	2,530	\$372.3
Smoking Material Ignition	6,500	260	810	\$78.5
Open Flame Ignition	10,200	150	1,120	\$156.5
Other	8,100	160	590	\$137.3
Other Materials				
Electric Cable Insulation	30,800	80	680	\$278.7
Interior Wall Covering	17,000	230	600	\$356.4
Wearing Apparel-Worn	900	140	210	\$7.0
Wearing Apparel-Not Worn	16,100	70	850	\$165.5
Floor Covering	10,200	130	470	\$147.8
Curtains, Drapes	4,200	30	370	\$49.4
Magazine, Newspaper	6,100	80	270	\$53.7
Thermal Insulation	4,900	10	80	\$38.8
Cabinet, Desk	7,500	90	420	\$102.0
Trash, Rubbish	31,400	40	410	\$136.4
Toy, Game	900	20	70	\$7.5

Source: U.S. Consumer Product Safety Commission / EPHA, from data obtained from the U.S. Fire Administration and NFPA.

Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10. Property loss is rounded to the nearest tenth of a million. Detail may not add to total due to rounding. Estimates less than 10 are denoted by an asterisk (*). A value of (--) indicates that no NFIRS reports were received.

TABLE 3
ESTIMATED FIRE LOSSES IN RESIDENTIAL STRUCTURES
HEATING EQUIPMENT, 1997

Heating Equipment	Fires	Civilian Deaths	Civilian Injuries	Property Loss (In Millions)
Total Residential	406,500	3,390	17,775	\$4,585.0
Total Heating Equipment	61,100	410	1,390	\$607.0
Solid Fuel	23,800	90	130	\$171.3
Fixed Heater	8,500	70	30	\$47.1
Portable Heater	100	--	10	\$1.1
Fireplace	4,800	10	40	\$53.9
Central Furnace	400	--	10	\$2.2
Chimney	7,600	10	20	\$34.8
Chimney Connector	2,000	--	10	\$25.8
Other	300	--	*	\$6.4
Gas-Fired	11,500	120	520	\$163.1
Fixed Heater	2,200	60	110	\$25.5
Portable Heater	900	20	70	\$16.2
Water Heater	4,500	30	200	\$55.8
Central Furnace	2,900	20	130	\$37.5
Other	1,000	*	20	\$28.1
Electric	11,100	90	320	\$114.3
Fixed Heater	2,000	10	60	\$21.0
Portable Heater	2,700	70	200	\$47.3
Water Heater	2,100	*	10	\$11.3
Central Furnace	3,500	--	40	\$24.7
Other	900	*	20	\$10.0
Liquid Fuel	4,800	60	180	\$39.3
Fixed Heater	600	10	20	\$4.0
Portable Heater	1,000	30	100	\$18.7
Water Heater	300	--	10	\$3.0
Central Furnace	2,700	--	30	\$12.6
Chimney or Connector	100	--	--	\$0.7
Other	100	30	10	\$0.2
All Other Fuel	9,900	60	220	\$119.0
Fixed Heater	1,500	30	40	\$14.5
Portable Heater	700	10	50	\$23.5
Fireplace	2,200	*	30	\$17.6
Water Heater	900	10	30	\$18.9
Central Furnace	1,200	*	40	\$12.0
Chimney	2,100	--	30	\$16.5
Chimney Connector	800	--	10	\$7.9
Other	400	--	10	\$8.0

Source: U.S. Consumer Product Safety Commission / EPHA, from data obtained from the U.S. Fire Administration and NFPA.

Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10. Property loss is rounded to the nearest tenth of a million. Detail may not add to total due to rounding. Estimates less than 10 are denoted by an asterisk (*). A value of (--) indicates that no NFIRS reports were received.

TABLE 4
ESTIMATED FIRE LOSSES IN RESIDENTIAL STRUCTURES
SELECTED ELECTRICAL EQUIPMENT, 1997

Electrical Equipment	Fires	Civilian Deaths	Civilian Injuries	Property Loss (In Millions)
Total Residential	406,500	3,390	17,775	\$4,585.0
Total Electrical	164,200	690	6,790	\$1,683.0
Electrical Heating Equipment	11,100	90	320	\$114.3
Central Heating	3,500	--	40	\$24.7
Fixed Heater	2,000	10	60	\$21.0
Portable Heater	2,700	70	200	\$47.3
Water Heater	2,100	*	10	\$11.3
Other	900	*	20	\$10.0
Electrical Cooking Equipment	63,300	120	3,400	\$282.4
Range/Oven	55,600	90	3,080	\$223.7
Toaster/Toaster Oven	2,900	20	110	\$26.8
Microwave Oven	1,400	10	60	\$7.9
Range/Oven Hood	1,000	--	30	\$6.0
Coffee Maker, Teapot	400	*	20	\$5.4
Deep Fat Fryer	300	--	40	\$2.2
Hot Plate	300	*	10	\$2.6
Other	1,300	*	70	\$7.8
Electrical Distribution	40,300	250	1,360	\$687.3
Installed Wiring	14,600	110	420	\$297.2
Light Fixture	6,000	10	130	\$84.0
Receptacle	3,500	10	120	\$44.7
Extension Cord	2,200	30	110	\$39.3
Other Electrical Cord	4,100	60	210	\$74.6
Lamp, Light Bulb	3,900	20	210	\$62.2
Circuit Breaker	1,800	*	40	\$26.6
Switch	1,400	*	40	\$18.4
Meter	1,000	--	10	\$11.9
Fuse	700	--	10	\$10.0
Transformer	400	--	10	\$4.3
Other	800	10	30	\$14.1
Electrical Appliances	22,100	90	790	\$222.5
Clothes Dryer	11,100	20	310	\$70.5
Fan	2,900	10	120	\$44.3
Washing Machine	1,400	--	30	\$3.0
Heat Tape	800	10	40	\$14.4
Television	900	10	50	\$15.1
Iron	300	*	20	\$5.1
Dishwasher	800	*	30	\$11.1
Radio, Cassette Player	1,000	10	60	\$15.8
Hair Dryer, Curling Iron	800	10	40	\$13.0
Electric Blanket	500	*	20	\$8.2
Other	1,800	10	70	\$22.0
Cooling Equipment	3,600	--	130	\$39.9
Refrigerator, Freezer	1,000	--	70	\$15.1
Central Air Conditioning	1,000	--	10	\$6.3
Fixed Room Air Conditioning	600	--	10	\$6.3
Portable Air Conditioning	700	--	30	\$10.0
Other	300	--	10	\$2.3

Source: U.S. Consumer Product Safety Commission / EPHA, from data obtained from the U.S. Fire Administration and NFPA
Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10. Property loss rounded to the nearest tenth of a million. Detail may not add to total due to rounding. Estimates less than 10 are denoted by asterisk (*). A value of (--) indicates that no NFIRS reports were received.

TABLE 5
ESTIMATED FIRE LOSSES IN RESIDENTIAL STRUCTURES
SELECTED GAS-FIRED EQUIPMENT, 1997

Gas-Fired Equipment	Fires	Civilian Deaths	Civilian Injuries	Property Loss (In Millions)
Total Residential	406,500	3,390	17,775	\$4,585.0
Total Gas-Fired Equipment	51,100	310	2,060	\$344.9
Gas Heating Equipment	11,500	120	520	\$163.1
Fixed Heater	2,200	60	110	\$25.5
Portable Heater	900	20	70	\$16.2
Central Furnace	2,900	20	130	\$37.5
Fireplace	300	--	10	\$10.3
Water Heater	4,500	30	200	\$55.8
Other	700	*	10	\$17.8
Gas Cooking Equipment	27,200	120	1,070	\$90.9
Range/Oven	25,800	120	990	\$77.8
Open Gas Grill	600	--	30	\$6.2
Portable Cooking	200	--	10	\$2.9
Other	600	--	30	\$3.9
Gas Appliances (Except Above)	3,600	10	110	\$19.1
Dryer	3,400	10	90	\$14.1
Other	300	*	20	\$5.0

Source: U.S. Consumer Product Safety Commission / EPHA, from data obtained from the U.S. Fire Administration and NFPA.

Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10. Property loss rounded to the nearest tenth of a million. Detail may not add to total due to rounding. Estimates less than 10 are denoted by asterisk (*). A value of (--) indicates that no NFIRS reports were received.

APPENDIX TABLE 1

**FIRE LOSS ESTIMATES EXCLUDING INCENDIARY AND SUSPICIOUS FIRES
SELECTED EQUIPMENT, 1997**

Equipment	Fires	Civilian Deaths	Civilian Injuries	Property Loss (In Millions)
Total Residential	379,900	3,080	16,860	\$4,148.6
Total Heating Equipment	60,500	390	1,380	\$591.8
Fixed Heater	14,700	160	260	\$111.0
Portable Heater	5,300	110	420	\$98.1
Central Heating	10,700	20	240	\$88.3
Fireplace	7,400	20	80	\$82.5
Chimney or Connector	13,000	10	80	\$94.9
Water Heater	7,800	30	260	\$87.2
Other	1,500	30	40	\$29.7
Total Cooking Equipment	104,000	280	5,070	\$461.0
Range/Oven	91,800	250	4,530	\$341.3
Gas	25,500	120	990	\$75.7
Electric	55,100	90	3,060	\$221.4
Other	11,100	40	480	\$44.2
All Other Cooking	12,200	30	540	\$119.7
Gas	1,400	--	80	\$13.0
Electric	7,600	30	320	\$58.4
Other	3,100	--	130	\$48.4
Total Electric Distribution	40,100	250	1,340	\$676.2
Installed Wiring	14,500	110	420	\$293.8
Cord, Plug	6,300	90	320	\$107.8
Switch, Outlet	4,900	10	160	\$62.8
Lamp, Light Fixture	9,800	30	350	\$145.8
Other	4,600	10	90	\$66.0
Total Appliances (Except Above)	29,800	110	970	\$272.6
TV, Radio, Phono	2,000	20	110	\$30.4
Dryer	16,700	30	430	\$96.9
Washing Machine	1,900	--	30	\$5.6
Heat Producing Appliance	3,400	30	190	\$55.1
Non-Heat Producing Appliance	2,800	10	120	\$44.0
Other	3,000	20	90	\$40.6
Total Cooling, Air Conditioning	3,800	--	130	\$40.2

Source: U.S. Consumer Product Safety Commission / EPHA, from data obtained from the U.S. Fire Administration and NFPA.
 Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10. Property loss rounded to the nearest tenth of a million. Detail may not add to total due to rounding. Estimates less than 10 are denoted by asterisk (*). A value of (--) indicates that no NFIRS reports were received.

APPENDIX TABLE 2

**FIRE LOSS ESTIMATES EXCLUDING INCENDIARY AND SUSPICIOUS FIRES
SELECTED PRODUCTS, 1997**

Product	Fires	Civilian Deaths	Civilian Injuries	Property Loss (In Millions)
Total Residential	379,900	3,080	16,860	\$4,148.6
By Form of Heat of Ignition				
Cigarette, Other Tobacco Prod.	23,900	870	2,080	\$319.5
Match	10,700	160	1,040	\$145.2
Child Play	7,100	110	800	\$120.7
Other	3,500	50	230	\$24.4
Lighter	8,600	210	1,060	\$151.0
Child Play	7,500	170	920	\$132.7
Other	1,100	40	130	\$18.3
Candle	13,300	210	1,350	\$201.0
By Form of Material First Ignited				
Upholstered Furniture	11,500	650	1,530	\$226.1
Smoking Material Ignition	5,700	460	830	\$104.0
Open Flame Ignition	2,600	80	500	\$64.3
Other	3,300	110	200	\$57.8
Mattress, Bedding	22,200	530	2,380	\$338.1
Smoking Material Ignition	6,400	260	800	\$76.4
Open Flame Ignition	8,200	120	1,010	\$128.9
Other	7,700	150	570	\$132.9
Other Materials				
Electric Cable Insulation	30,700	80	680	\$278.1
Interior Wall Covering	15,800	230	560	\$333.9
Wearing Apparel-Worn	800	140	200	\$6.9
Wearing Apparel-Not Worn	14,800	70	770	\$154.0
Floor Covering	8,600	130	430	\$131.5
Curtains, Drapes	3,800	30	360	\$47.8
Magazine, Newspaper	4,700	80	240	\$46.7
Thermal Insulation	4,800	10	80	\$38.4
Cabinet, Desk	7,200	90	420	\$98.2
Trash, Rubbish	28,700	40	360	\$123.9
Toy, Game	800	20	70	\$7.1

Source: U.S. Consumer Product Safety Commission / EPHA, from data obtained from the U.S. Fire Administration and NFPA.

Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10. Property loss is rounded to the nearest tenth of a million. Detail may not add to total due to rounding. Estimates less than 10 are denoted by an asterisk (*). A value of (--) indicates that no NFIRS reports were received.

APPENDIX TABLE 3

**FIRE LOSS ESTIMATES EXCLUDING INCENDIARY AND SUSPICIOUS FIRES
HEATING EQUIPMENT, 1997**

Heating Equipment	Fires	Civilian Deaths	Civilian Injuries	Property Loss (In Millions)
Total Residential	379,900	3,080	16,860	\$4,148.6
Total Heating Equipment	60,500	390	1,380	\$591.8
Solid Fuel	23,700	90	130	\$169.9
Fixed Heater	8,500	70	30	\$46.2
Portable Heater	100	--	10	\$1.1
Fireplace	4,800	10	40	\$53.8
Central Furnace	400	--	10	\$2.2
Chimney	7,500	10	20	\$34.8
Chimney Connector	1,900	--	10	\$25.4
Other	300	--	*	\$6.4
Gas-Fired	11,400	120	520	\$161.3
Fixed Heater	2,200	60	110	\$25.4
Portable Heater	900	20	60	\$15.9
Water Heater	4,500	30	200	\$54.5
Central Furnace	2,900	20	130	\$37.4
Other	1,000	*	20	\$28.1
Electric	11,000	70	320	\$113.2
Fixed Heater	2,000	10	60	\$21.0
Portable Heater	2,600	60	200	\$46.6
Water Heater	2,000	--	10	\$10.9
Central Furnace	3,500	--	40	\$24.7
Other	900	*	20	\$9.9
Liquid Fuel	4,800	60	180	\$39.2
Fixed Heater	600	10	20	\$4.0
Portable Heater	900	30	100	\$18.6
Water Heater	300	--	10	\$3.0
Central Furnace	2,700	--	30	\$12.6
Chimney or Connector	100	--	--	\$0.7
Other	100	30	10	\$0.2
All Other Fuel	9,600	40	220	\$108.2
Fixed Heater	1,500	30	40	\$14.4
Portable Heater	700	--	50	\$15.9
Fireplace	2,200	*	30	\$16.6
Water Heater	900	10	30	\$18.6
Central Furnace	1,200	*	40	\$11.6
Chimney	2,000	--	30	\$16.5
Chimney Connector	800	--	10	\$7.5
Other	400	--	10	\$7.2

Source: U.S. Consumer Product Safety Commission / EPHA, from data obtained from the U.S. Fire Administration and NFPA.

Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10. Property loss is rounded to the nearest tenth of a million. Detail may not add to total due to rounding. Estimates less than 10 are denoted by an asterisk (*). A value of (--) indicates that no NFIRS reports were received.

APPENDIX TABLE 4

FIRE LOSS ESTIMATES EXCLUDING INCENDIARY AND SUSPICIOUS FIRES

SELECTED ELECTRICAL EQUIPMENT, 1997

Electrical Equipment	Fires	Civilian Deaths	Civilian Injuries	Property Loss (In Millions)
Total Residential	379,900	3,080	16,860	\$4,148.6
Total Electrical	163,000	670	6,740	\$1,663.1
Electrical Heating Equipment	11,000	70	320	\$113.2
Central Heating	3,500	--	40	\$24.7
Fixed Heater	2,000	10	60	\$21.0
Portable Heater	2,600	60	200	\$46.6
Water Heater	2,000	--	10	\$10.9
Other	900	*	20	\$9.9
Electrical Cooking Equipment	62,800	120	3,390	\$279.8
Range/Oven	55,100	90	3,060	\$221.4
Toaster/Toaster Oven	2,900	20	110	\$26.7
Microwave Oven	1,400	10	60	\$7.8
Range/Oven Hood	1,000	--	30	\$6.0
Coffee Maker, Teapot	400	*	20	\$5.4
Deep Fat Fryer	300	--	40	\$2.2
Hot Plate	300	*	10	\$2.6
Other	1,300	*	60	\$7.7
Electrical Distribution	40,100	250	1,340	\$676.2
Installed Wiring	14,500	110	420	\$293.8
Light Fixture	5,900	10	130	\$83.8
Receptacle	3,500	10	110	\$44.4
Extension Cord	2,200	30	110	\$37.1
Other Electrical Cord	4,100	60	210	\$70.6
Lamp, Light Bulb	3,900	20	210	\$62.0
Circuit Breaker	1,800	*	40	\$26.5
Switch	1,400	*	40	\$18.3
Meter	1,000	--	10	\$11.9
Fuse	700	--	10	\$10.0
Transformer	400	--	10	\$4.0
Other	700	10	30	\$13.7
Electrical Appliances	22,000	90	780	\$221.2
Clothes Dryer	11,100	20	310	\$70.2
Fan	2,800	10	120	\$44.0
Washing Machine	1,300	--	30	\$3.0
Heat Tape	800	10	40	\$14.2
Television	900	10	50	\$15.1
Iron	300	*	20	\$5.0
Dishwasher	800	*	30	\$11.0
Radio, Cassette Player	1,000	10	60	\$15.7
Hair Dryer, Curling Iron	700	10	40	\$12.9
Electric Blanket	500	*	20	\$8.1
Other	1,800	10	70	\$21.9
Cooling Equipment	3,600	--	130	\$38.6
Refrigerator, Freezer	1,000	--	70	\$14.7
Central Air Conditioning	1,000	--	10	\$6.2
Fixed Room Air Conditioning	600	--	10	\$6.3
Portable Air Conditioning	700	--	30	\$10.0
Other	300	--	10	\$1.5

Source: U.S. Consumer Product Safety Commission / EPHA, from data obtained from the U.S. Fire Administration and NFPA

Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10. Property loss rounded to the nearest tenth of a million. Detail may not add to total due to rounding. Estimates less than 10 are denoted by asterisk (*). A value of (--) indicates that no NFIRS reports were received.

APPENDIX TABLE 5

**FIRE LOSS ESTIMATES EXCLUDING INCENDIARY AND SUSPICIOUS FIRES
SELECTED GAS-FIRED EQUIPMENT, 1997**

Gas-Fired Equipment	Fires	Civilian Deaths	Civilian Injuries	Property Loss (In Millions)
Total Residential	379,900	3,080	16,860	\$4,148.6
Total Gas-Fired Equipment	50,400	300	2,050	\$334.5
Gas Heating Equipment	11,400	120	520	\$161.3
Fixed Heater	2,200	60	110	\$25.4
Portable Heater	900	20	60	\$15.9
Central Furnace	2,900	20	130	\$37.4
Fireplace	300	--	10	\$10.3
Water Heater	4,500	30	200	\$54.5
Other	700	*	10	\$17.8
Gas Cooking Equipment	26,900	120	1,070	\$88.7
Range/Oven	25,500	120	990	\$75.7
Open Gas Grill	600	--	30	\$6.2
Portable Cooking	200	--	10	\$2.9
Other	600	--	30	\$3.9
Gas Appliances (Except Above)	3,600	10	110	\$18.8
Dryer	3,300	10	90	\$14.1
Other	200	*	20	\$4.7

Source: U.S. Consumer Product Safety Commission / EPHA, from data obtained from the U.S. Fire Administration and NFP,

Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10. Property loss rounded to the nearest tenth of a million. Detail may not add to total due to rounding. Estimates less than 10 are denoted by asterisk (*). A value of (--) indicates that no NFIRS reports were received.

Methodology

This report is based on the U.S. Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS) data and the National Fire Protection Association's (NFPA) annual survey of fire departments. The NFIRS system is a compilation of fire reports completed by U.S. fire departments. In 1997, the NFIRS contained reports of 157,137 residential structure fires that resulted in 1,156 civilian deaths, 7,508 civilian injuries, and over \$1.750 billion in property loss from 40 states. Even though the system is not a random sample, the NFIRS contains data on roughly 1 out of every 2.6 estimated residential structure fires in the U.S., 1 of every 2.9 deaths, and 1 of every 2.4 injuries in those fires. It is believed that the distribution of participating fire departments is reasonably representative of all fire departments in the U.S. The NFPA survey is based on a stratified random sample of fire departments in the U.S. The sample is stratified by the size of community protected by the department. The NFPA makes national projections by weighting sample results according to the proportion of total U.S. population accounted for by communities of each size.

These data capture only fires attended by fire departments. It should be noted that product-specific death and injury estimates fluctuate year-to-year and that a small increase or decrease in any one year is not sufficient to denote a trend.

Overall Residential Structure Estimates

In order to compute the national estimates for residential structure fire losses, multiple characteristics, or variables, for each NFIRS report were taken into account. Each variable on an NFIRS report describes an aspect of the fire incident. The variables used to produce the estimates in this report are as follows²:

<u>Variable</u>	<u>Describes...</u>
Equipment	Equipment (if any) that provided the heat which started the fire.
Form of Heat	Form of heat energy igniting the fire, e.g., flame, spark from electrical equipment, spark from fuel-burning equipment.
Form of Material	The item first ignited, apart from its composition, e.g., furniture, magazine.

² NFPA Committee on Fire Reporting, Uniform Coding for Fire Protection: NFPA No. 901 - 1976, May 1976.

Ignition Factor

Factor that allowed the heat of ignition and the material first ignited to combine to start the fire. This variable indicates whether the fire was incendiary (arson), suspicious in nature, or due to another ignition factor, such as equipment malfunction.

Each of the above variables is assigned an NFIRS code that best describes the given aspect of the fire incident. If no NFIRS code is assigned for the variable, then the report is considered “unknown” in that variable. For example, if the Form of Material is not given on an NFIRS report, then that report is considered “unknown” in the Form of Material variable.

Most of the national estimates in the first five tables are given with respect to two variables. For example, Table 2 presents the estimated number of fires where the Form of Heat was a Match and the Ignition Factor was Child Play (7,100). Table 5 presents the estimated number of fires involving a Portable Heater where the Form of Heat was a spark, flame or heat from gas-fueled equipment (implying that a gas-fueled portable heater was involved) (900). In order to compute the estimates for two variables, one variable was chosen as the primary variable with the other chosen as the secondary variable.

Example 1: We are interested in the national residential estimate for fires involving Upholstered Furniture as the Form of Material. Of these fires, we are interested in the estimated number where the Form of Heat was a flame type Lighter.

Since we are most interested in the estimated number of fires attributed to Upholstered Furniture, we choose Form of Material as the primary variable. Since the number of Upholstered Furniture fires involving a Lighter is of secondary interest, we choose Form of Heat as the secondary variable.

In addition, any unknowns in the primary or secondary variables were taken into account under the general assumption that the distribution of unknowns in a variable followed the distribution of the variable’s known values. For example, if 90 percent of NFIRS reports where Equipment was known involved Heating Equipment, while 10 percent involved Cooking Equipment, then we would treat 90 percent of the unknowns as if they involved Heating Equipment and 10 percent of the unknowns as if they involved Cooking Equipment. Hall and Harwood give a detailed description of the methodology for allocating unknowns in one or two variables, in which the distribution of the unknowns is assumed to follow the distribution of the knowns.³

³John R. Hall, Jr. and Beatrice Harwood, “The National Estimates Approach to U.S. Fire Statistics”, Fire Technology, May 1989, Volume 25, Number 2, pp. 99-113.

Allocation of Unknowns in the Primary Variable

Estimates were derived first for the primary variable by computing percentages of fires, deaths, injuries, and property loss in NFIRS and multiplying them by the estimated totals of U.S. fires, deaths, injuries, and property loss from the NFPA annual survey. For example, the national estimate for the number of fires involving Furniture was computed by taking the percentage of NFIRS residential fires (with known Form of Material) that were attributed to Furniture. This percentage was multiplied by the estimated total number of residential structure fires from the NFPA survey.

Example 2: Compute the national residential estimate for fires involving Furniture where:

NFIRS fire reports = 157,137

NFIRS fires where Form of Material was Furniture = 9,413

NFIRS fires where Form of Material was unknown = 22,237

NFIRS fires where Form of Material was known = $157,137 - 22,237 = 134,900$

NFPA estimated fires for residential structures = 406,500

Percent of NFIRS fires having known Form of Material,
where Form of Material was Furniture = $9,413 / 134,900 = 6.98\%$ (approx.)

National estimate for Furniture fires = approx. 6.98% of 406,500 = 28,365

In the above example, any fires for which the Form of Material was unknown were assumed to follow the known Form of Material distribution. Specifically, approximately 6.98% of fires where the Form of Material was unknown were assumed to involve Furniture. This assumption expands to the general case, such as when Equipment or Form of Heat was the primary variable, as opposed to Form of Material.

Allocation of "Within Category" Unknowns in the Primary Variable

The above methodology was expanded further for the 1997 estimates in order to allocate fires, deaths, injuries, and property loss in cases where there was some information available, but not enough to assign a specific value. For example, for the Form of Material variable, Furniture is a general category. Nested within the Furniture category are more specific NFIRS codes:

- Upholstered Furniture
- Non-upholstered Furniture
- Cabinetry
- Ironing Board
- Appliance Casing
- Furniture not classified above
- Furniture; insufficient information available to classify further

Say we have computed the national estimate for fires involving Furniture as in Example 2. Now, we are interested in computing the national estimate for Upholstered

Furniture fires, specifically. To compute this estimate, we assume that the NFIRS fires with Form of Material “Furniture; insufficient information available to classify further” follow the same distribution as Furniture fires having specific information available.

Example 3: Compute the national residential estimate for fires involving Upholstered Furniture where:

NFIRS fires where Form of Material was Furniture = 9,413
NFIRS fires where Form of Material was Upholstered Furniture = 4,015
NFIRS fires where Form of Material was “Furniture;
insufficient information” = 567
NFIRS fires where Form of Material was Furniture and
not “Furniture; insufficient information” = $9,413 - 567 = 8,846$
National estimate for Furniture fires = 28,365

Percent of Furniture fires (excluding “insufficient Information”) where Form of Material was Upholstered Furniture = $4,015 / 8,846 = 45.39\%$ (approx.)

**National estimate for Upholstered Furniture fires =
approx. 45.39% of 28,365 = 12,874**

In the above example, approximately 45.39% of Furniture fires coded as “Furniture; insufficient information” were assumed to involve Upholstered Furniture. This type of allocation was performed for each variable of interest, within each general category of values. For convenience, we refer to NFIRS reports coded as belonging to a general category, but that have “insufficient information” within the category, as “within category” unknowns in the variable of interest. It should be noted that in previous fire loss reports, estimates corresponding to the “within category” unknowns were reported as “unknown” under the appropriate category, and were not allocated in most cases.

Allocation of Unknowns and “Within Category” Unknowns in the Secondary Variable

To compute a national residential estimate with respect to both a primary and a secondary variable, an estimate in the primary variable (e.g., Form of Material) was first computed as in the above sections (e.g., Upholstered Furniture fires). In the above examples that deal with primary variable Form of Material, the secondary variable of interest is Form of Heat. Say we are interested in computing the estimate for Upholstered Furniture fires where the Form of Heat was in the Open Flame category. We make the assumption that within NFIRS fires where Form of Material is Upholstered Furniture, fires having unknown Form of Heat follow the distribution of Upholstered Furniture fires having known Form of Heat.

Example 4: Compute the national residential estimate for Upholstered Furniture fires involving an Open Flame as the Form of Heat where:

NFIRS Upholstered Furniture fires = 4,015
NFIRS Upholstered Furniture fires where
Form of Heat category was Open Flame = 888
NFIRS Upholstered Furniture fires where Form of Heat was unknown = 762

NFIRS Upholstered Furniture fires where
Form of Heat was known = $4,015 - 762 = 3,253$
National estimate for Upholstered Furniture fires = 12,874

Percent of NFIRS Upholstered Furniture fires having known Form of Heat,
where Form of Heat category was Open Flame =
 $888 / 3,253 = 27.30\%$ (approx.)

**National estimate for Upholstered Furniture fires
involving an Open Flame = approx. 27.30% of 12,874 = 3,514**

Note that the known Form of Heat distribution used to allocate Upholstered Furniture fires having unknown Form of Heat was based on the set of Upholstered Furniture fires only. In general, the known distribution computed for the secondary variable is specific to the value of the primary variable. Again, the assumption is applied to all other combinations of primary and secondary variables.

Previous to this fire loss report, estimates computed for Equipment did not reflect an allocation of unknowns in the secondary variable Form of Heat. Equipment estimates corresponding to unknown Form of Heat were included in the estimates for "All Other Fuel". Also, Form of Heat estimates did not reflect the allocation of unknowns in the secondary variable Ignition Factor, but included separate estimates that corresponded to the unknowns.

"Within category" unknowns in the secondary variable were also allocated using the known distribution determined by the primary variable value. The following example computes a national estimate for Upholstered Furniture fires where Form of Heat was a flame type lighter. Lighters correspond to a specific Form of Heat code within the Open Flame category.

Example 5: Compute the national residential estimate for Upholstered Furniture fires where the Form of Heat was Lighter where:

NFIRS Upholstered Furniture fires where
Form of Heat category was Open Flame = 888
NFIRS Upholstered Furniture fires where Form of Heat was Lighter = 226
NFIRS Upholstered Furniture fires where Form of Heat was "Open Flame;
insufficient information available to classify further" = 106
NFIRS Upholstered Furniture fires where Form of Heat was Open Flame and
not "Open Flame; insufficient information" = $888 - 106 = 782$
National estimate for Upholstered Furniture fires
involving an Open Flame = 3,514

Percent of Upholstered Furniture fires where Form of Heat was Open Flame
(excluding "Open Flame; insufficient Information") having Form of Heat
coded as Lighter = $226 / 782 = 28.90\%$ (approx.)

**National estimate for Upholstered Furniture fires involving Lighters =
approx. 28.90% of 3,514 = 1,016**

In previous fire loss reports, “within category” unknowns in secondary variables were not allocated.

Residential Structure Estimates Excluding Incendiary and Suspicious Fires

National estimates for residential structure fires, deaths, injuries, and property loss that exclude incendiary and suspicious fires were computed by first deriving the national residential estimates as above. The portion of each estimate corresponding to fires of an incendiary or suspicious nature, based on Ignition Factor, was then subtracted from the overall estimates. Similar to previous cases, NFIRS reports having unknown Ignition Factor were assumed to follow the known Ignition Factor distribution within the specific combination of primary and secondary variable values.

Example 6: Compute the national residential estimate for Upholstered Furniture fires involving Lighters, excluding incendiary and suspicious fires, where:

NFIRS Upholstered Furniture fires involving Lighters = 226

NFIRS Upholstered Furniture fires involving Lighters where

Ignition Factor coded as Incendiary or Suspicious = 44

NFIRS Upholstered Furniture fires involving Lighters

where Ignition Factor unknown = 4

#NFIRS Upholstered Furniture fires involving Lighters

having known Ignition Factor = $226 - 4 = 222$

National estimate for Upholstered Furniture fires involving Lighters = 1,016

Percent of Upholstered Furniture fires involving Lighters (having known Ignition Factor) where Ignition Factor was coded as Incendiary or Suspicious = $44 / 222 = 19.82\%$ (approx.)

National estimate for Incendiary or Suspicious Upholstered Furniture fires involving Lighters = approx. 19.82% of 1,016 = 201

National estimate for Upholstered Furniture fires involving Lighters, excluding Incendiary and Suspicious fires = $1,016 - 201 = 815$

“Within category” unknowns in Ignition Factor did not need to be allocated to produce the national estimates excluding incendiary and suspicious fires. The *Total Residential* column totals presented in all Appendix Tables reflect the aggregated fire, death, injury and property loss estimates where Equipment was the primary variable, Form of Heat was the secondary variable, and losses associated with incendiary and suspicious fires were excluded based on Ignition Factor.

Allocation With No Known Distribution

In the rare instances where there were only unknowns in a variable (i.e., no known distribution), an aggregation method was devised to identify an appropriate known distribution. For example, all NFIRS fires with Form of Material coded as “Ceiling Coverings” and Form of Heat coded as “Backfire from Engine” were unknown in

the Ignition Factor variable. Therefore, the portion of these fires to be excluded as incendiary or suspicious could not be determined. Since Ceiling Coverings is a specific code within the Form of Material category “Structural Component”, the known Ignition Factor distribution for all Structural Component fires that involved Backfire from Engines was used.

Example 7: Compute the national residential estimate for Ceiling Covering fires involving Backfire from Engines, excluding incendiary and suspicious fires. All values of Ignition Factor are unknown where:

NFIRS Ceiling Covering fires involving Backfire
(all have unknown Ignition Factor) = 1
National estimate for Ceiling Covering fires involving Backfire = 4
NFIRS Structural Component fires involving Backfire = 7
NFIRS Structural Component fires involving Backfire where
Ignition Factor coded as Incendiary or Suspicious = 1
NFIRS Structural Component fires involving Backfire
where Ignition Factor unknown = 2
#NFIRS Structural Component fires involving Backfire
having known Ignition Factor = $7 - 2 = 5$

Percent of Structural Component fires involving Backfire (having known Ignition Factor) where Ignition Factor was coded as Incendiary or Suspicious
 $= 1 / 5 = 20.00\%$

National estimate for Incendiary or Suspicious *Ceiling Covering* fires involving Backfire = 20.00% (percentage of aggregated set) of 4 = 0.80

National estimate for Ceiling Covering fires involving Backfire, excluding Incendiary and Suspicious fires = $4 - 0.80 = 3.20$

As in the above example, relatively small estimates were involved in cases where there were only unknowns in a variable. Aggregation levels were developed as appropriate based on the variables involved and the stage of estimation.

Selected Electrical Equipment Tables (Table 4 and Appendix Table 4)

The estimates for products listed below⁴ were derived from a review of fire reports that included product identification/specification beyond that identified in current NFIRS codes. For example, electric heat tapes, irons, portable hand-held hair dryers, curling irons, and electric blankets are typically found in two or three of the NFIRS codes, such as the Equipment codes “Portable Appliance Designed to Produce Heat” and “Appliances, not specified”. Since all of these products are electrical, only NFIRS reports having a Form of Heat considered as originating from electrical equipment were

⁴ Toasters and toaster ovens, microwave ovens, coffee makers and teapots, hotplates, receptacles, extension cords, other electrical cords, circuit breakers, switches, fuses, fans, heat tapes, televisions, irons, dishwashers, radios and cassette players, hair dryers and curling irons, and electric blankets.

searched. The exception to this rule was that all NFIRS reports in the Electrical Distribution Equipment category were searched, regardless of their Form of Heat values.

For each product and set of NFIRS reports searched, the percentage of NFIRS fires corresponding to the product was computed. Each product percentage was multiplied by the national estimates for fires, deaths, injuries, and property loss corresponding to the set of NFIRS reports searched. These “partial estimates” were then summed across all NFIRS sets that were searched to construct the fire loss estimates for the product.

Example 8: Compute the national residential estimate for Microwave fires where:

<u>Equipment Code</u>	<u>% of Fires w/ Microwave</u>	<u>Equip. Fire Estimate</u>	<u>Microwave Fire Estimate</u>
Fixed Food Warming App.	2.23%	693	15
Portable Warming App.	11.39%	3,426	390
Cooking Eq.; not spec.	61.22%	1,599	979
Cord or Plug	0.19%	7,168	14
Portable App. for Producing Controlled Heat	0.93%	2,925	27
Appliance Eq.; not spec.	0.68%	2,528	17
National estimate for Microwave fires			1,442

The estimation methodology for deaths, injuries, and property loss involving these products assumed that they occurred in the same proportion as fires. The product percentages in each Equipment code were computed using all fires, including incendiary and suspicious incidents. In Table 4, the product estimates were computed by applying the product percentages to the Equipment estimates for all residential structures. In Appendix Table 4, the product estimates were computed by applying the product percentages to the Equipment estimates that excluded incendiary and suspicious fires.

In previous reports, the *Total Electrical* column totals (Table 4 and Appendix Table 4) included only Electrical Distribution Equipment where the Form of Heat was considered as originating from electrical equipment. In this report, the column totals include all Electrical Distribution Equipment, regardless of the Form of Heat.