2015–2017 Residential Fire Loss Estimates*

U.S. National Estimates of Fires, Deaths, Injuries, and Property Losses from Unintentional Fires

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* This analysis was prepared by the CPSC staff. It has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

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Executive Summary

This report presents estimates of consumer product-related losses that occurred in U.S. residential structure fires attended by the fire service. 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's (NFPA) Survey of Fire Departments for U.S. Fire Experience for 2015 through 2017.

The fire and fire loss estimates presented in this report pertain to unintentional residential structure fires and civilian casualties. The estimates are:

- 370,900 fires, 2,230 deaths, 10,800 injuries, and $6.63 billion in property losses in 2015;
- 351,900 fires, 2,410 deaths, 10,370 injuries and $6.36 billion in property losses in 2016;
- 362,600 fires, 2,230 deaths, 10,060 injuries, and $7.07 billion in property losses in 2017; and
- an estimated annual average of 361,800 fires, 2,290 deaths, and 10,410 injuries and $6.69 billion in property losses over the 3-year period from 2015 through 2017.

Consumer products involved in fires can be categorized as "sources of ignition" or "the materials first ignited." Sources of ignition can be small, such as candles, or large, like ranges, for example. The larger sources of ignition, *e.g.*, operating equipment, are identified in NFIRS as "equipment." Smaller sources of ignition that are not equipment, such as candles, matches, and lighters, are identified in NFIRS as "heat sources." Consumer products can also be involved as items or materials contributing to flame spread. For this report, CPSC staff produced estimates based on the sources of ignition and the materials first ignited, but not for the items or materials contributing to flame spread.

Because the fire losses are derived separately for sources of ignition and materials first ignited, estimates presented in this report can overlap in some cases. For example, a fire involving a candle igniting a mattress will count as a candle fire (Heat Source) and a mattress fire (Item First Ignited). Additionally, these estimates do not account for all of the involvement of materials because items that are neither the Heat Source, nor the Item **First** Ignited, can still be involved in (and in some cases be a significant factor in) residential fire losses. An example is a cigarette igniting newspapers and then the flaming newspapers igniting upholstered furniture. In this case, the upholstered furniture was neither the heat source, nor the first item ignited, but the furniture represents a significant fuel load, and it increases the potential for life-threatening conditions to occupants.

The same products continue to contribute to the greatest estimated numbers of fire losses (as measured by Equipment Involved in Ignition, Heat Sources, and Items First Ignited). Tables 1a–5d show:

- Cooking equipment accounted for the largest percentage of fires. An estimated annual average of 170,600 cooking equipment-related fires from 2015 through 2017 accounted for 47.2 percent of the average annual estimate of total residential fires for the same period. The corresponding death estimates constitute an annual average of 250 deaths, which is 11.1 percent of the average annual estimate of total residential fire deaths. The annual average number of cooking fire injuries for 2015 through 2017 was estimated to be 3,390, which represents 32.6 percent of the total estimated annual average number of injuries for the same period. Much of these losses were associated with range and oven fires.

- Heating and cooling equipment fires constituted the second largest share of total residential fires. The estimated annual average of 42,600 fires for 2015 to 2017 was 11.8 percent of the annual average estimate of total residential fires during the same period. The corresponding death estimate is an annual average of 230 deaths, which is 10.0 percent of the average annual estimated number of total residential fire deaths. The corresponding injuries for the 3 years averaged to an annual estimate of 840. This accounts for 8.1 percent of the annual average estimate of total injuries during 2015 to 2017.

- An estimated annual average of 19,900 fires was attributable to electrical distribution equipment (*e.g*., installed wiring, lighting). This is 5.5 percent of the estimated annual average number of residential fires for this period. The annual average death estimate is 210 (9.0 percent of average annual estimated residential fire deaths); and the injury estimates averaged 600, which is 5.7 percent of the estimated annual average of residential fire injuries.

- For Item First Ignited, upholstered furniture was involved in the greatest number of fire deaths. From 2015 through 2017, an estimated annual average of 390 deaths was associated with these fires. This constitutes 17.0 percent of the estimated annual average of total deaths (from an estimated 1.2 percent of the fires) associated with residential structure fires for the same period. On average, during 2015 to 2017, mattress or bedding ignitions accounted for an annual average of 320 deaths, which is 14.0 percent of the average annual estimated number of total residential fire deaths (from an estimated 1.8 percent of the fires).

  It is noteworthy that for 2017, the estimated number of deaths where upholstered furniture was the item first ignited declined to 290 (from 510 in 2015 and 370 in 2016), which is below the 2017 estimate for mattress or bedding deaths (340).

- For Heat Source, smoking materials were the largest contributor to deaths, associated with an annual average of 580 deaths from 2015 to 2017. This is 25.4 percent of the estimated annual average of total residential fire deaths. Smoking materials, however, comprised only 3.0 percent of the total estimated residential fires.

- Among products that are Heat Sources, candles had the second highest estimated number of deaths. The estimated annual average of deaths from candle fires is 80, which is 3.3 percent of the average estimated total number of residential fire deaths from 2015 to 2017. Candles account for an estimated 1.5 percent of the fires.

- There were also an estimated 50 deaths from cigarette lighter fires (2.2 percent of the estimated annual average of total residential fire deaths), although lighters are only involved in an estimated 0.4 percent of the fires.

- On average, matches were responsible for 10 deaths, or 0.6 percent of total deaths annually. Matches were involved in an estimated 0.1 percent of residential fires.

- There was a decline in the estimates of total fires between 2015 and 2016, from an estimate of residential structure fires of 370,900 in 2015, to 351,900 in 2016, a decline of 5.1 percent. The estimate then increased from 351,900 in 2016, to 362,600 in 2017, an increase of 3.0 percent.

- There was a decline in both the total residential death and injury estimates from 2016 to 2017. The death estimate declined from 2,410 to 2,230 (7.3 percent), and the injury estimate declined from 10,370 to 10,060 (3.0 percent).

Introduction

The fire loss estimates presented in this report are based on the National Fire Protection Association's (NFPA) national fire loss estimates[1] and the U.S. Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS) data. The NFPA makes national estimates of fires, deaths, injuries, and property losses based on a probability sample survey of U.S. fire departments. NFIRS compiles fire incident reports submitted voluntarily to the USFA by U.S. fire departments. Not all the states reporting include data from all fire departments in the state. Product-specific information, such as the equipment involved in the ignition of the fire, or the item that was first ignited in the fire, is among the wealth of information collected and available in NFIRS data. NFIRS product-specific frequency counts are weighted up to the NFPA estimates for total U.S. fire losses to derive the estimates that are presented in this report.

The estimated number of fires and associated fire losses pertain to fires in residential properties only. These include single-family and multifamily dwellings. Mobile and motor homes, when used as a structure, and not in transit, are also included. Injury and death estimates pertain to civilian[2] casualties only. The property losses include property and content losses, as estimated by fire departments. In this report, for convenience, property and content losses are referred to as "property losses."

CPSC staff has been producing estimates of residential fires and related deaths, injuries, and property losses since the early 1980s. However, over the years, NFIRS has undergone major changes. This, in turn, has necessitated changes in the way CPSC analysts produce the product-specific estimates. Beginning with 1999 data, a major revision was made to the NFIRS data coding system, and CPSC implemented version 5.0. By 2009, 100 percent of fire departments were coding using this version.

NFIRS data were weighted up to the 2015, 2016, and 2017 NFPA estimates for total U.S. fire losses to derive the product-specific estimates presented in this report. This was done separately for fires, deaths, injuries, and property loss.

Beginning with version 5.0, NFIRS introduced newly created codes to identify confined fires (those that do not spread beyond the originating item). To encourage the reporting of these fires, NFIRS requires only limited information. As the use of version 5.0 increased from 1999 forward, an increasingly large number of confined fires were reported. In 1999, about 2 percent of residential structure fires were reported as confined; by 2017, 50 percent of residential structure fires reported to NFIRS were identified as confined fires.

It is usually not possible to determine the type of equipment involved in the incidents coded as "confined fires" because the equipment is rarely coded. For example, when a fire is identified as a "confined cooking fire" in NFIRS, it is rarely possible to distinguish a fire started by a range versus other cooking equipment, such as a microwave oven, or toaster. Consequently, confined cooking fire losses are only included as part of the "Total Cooking Equipment" fires, but they are not included in subcategories that define the equipment involved or the power source. Because

[1] Hylton Haynes, "Fire Loss in the U.S. During 2014," National Fire Protection Association (NFPA), September 2015; Hylton Haynes, "Fire Loss in the U.S. During 2015," National Fire Protection Association (NFPA), September 2016; Ben Evarts, "Fire Loss in the U.S. During 2016," National Fire Protection Association (NFPA), September 2017.

[2] Injuries and deaths involving fire service, police, or emergency medical service personnel are not included in the estimates for this report.

ranges certainly are involved in some confined fires, this should be considered in evaluating the cooking fire hazard. The same is true for microwave ovens and other cooking equipment.

Consumer products, for which there are estimates of fires and fire losses in this report, are either ignition sources for fires, or materials ignited by fires. The larger ignition sources, such as ranges, clothes dryers, and space heaters, are considered equipment and are covered by the NFIRS variable called "Equipment Involved in Ignition." Smaller ignition sources, such as candles, matches, or lighters, are heat sources and fall under the NFIRS variable called "Heat Source." Some of the consumer products that are materials ignited in fires are upholstered furniture, mattresses and bedding, clothing, curtains and drapes, and more. There are codes for these products under the NFIRS variable called "Item First Ignited."

Fires can be associated with more than one product. For example, a fire can be a lighter fire and a curtain fire. Such a fire would contribute to the estimates for "Lighters," as well as the estimates for "Curtains, Drapes."

In some instances, consumer products ignited by the fire may contribute to the spread or severity of the fire, but not be included in the category, Item First Ignited. An example would be where carpeting is the Item First Ignited in the fire, but upholstered furniture ignites next, and increases the severity of the fire. In that case, upholstered furniture plays a role in the fire, but the fire is not counted toward the estimates for upholstered furniture fires and losses. Some consumer products, such as mattresses and upholstered furniture, due to their larger fuel loads, tend to lead to bigger, more dangerous fires when they ignite.

Results

Data are presented using five main tables consistent with CPSC staff's previous reports. Each numbered table (1–5) has four associated sub-tables: Table "a" presents the fire estimates; "b" presents the death estimates; "c" presents the injury estimates; and "d" presents the property loss estimates. As in previous years, only selected product-specific estimates are included in these tables, so the details may not add up to the totals that appear in the headings. All of the product categories in the tables, with the exception of smoking materials, contain products within CPSC's jurisdiction. Intentionally set fires and their associated losses, which include the deliberate misuse of heat sources, or fires of an incendiary nature, are excluded from the estimates.

In Tables 1, 3, 4, and 5, Equipment Involved in Ignition codes were used to identify the types of products involved; meanwhile, in Table 2, either the Heat Source or the Item First Ignited was the primary means of identifying the product. Thus, some estimates provided in the different sections of the tables overlap. For example, in Table 2, estimates of fires involving cigarette ignition of upholstered furniture are included in the estimates for cigarettes (by Heat Source), as well as in the estimates for upholstered furniture-smoking material ignition (by Item First Ignited). Additional details about the estimates and the data system are included in the Methodology section of this report.

TABLE 1a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
SELECTED EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[3]	**370,900**	**351,900**	**362,600**	**361,800**
Total Heating and Cooling Equipment[3]	**47,000**	**41,300**	**39,600**	**42,600**
Local Fixed Heater	5,700	5,300	4,800	5,300
Portable Heater	2,000	1,700	1,500	1,700
Central Heating	1,000	1,000	800	1,000
Fireplace, Chimney, Chimney Connector[3]	20,300	16,500	15,900	17,600
Water Heater	2,100	2,000	1,600	1,900
Air Conditioning	1,700	1,700	1,400	1,600
Other[3]	15,500	14,400	13,600	14,500
Total Cooking Equipment[3]	**176,100**	**165,400**	**170,400**	**170,600**
Range/Oven	19,900	17,400	16,200	17,800
Gas	*2,700*	*2,200*	*2,300*	*2,400*
Electric	*17,200*	*15,100*	*13,700*	*15,300*
Other	*100*	*100*	*200*	*100*
Microwave Oven	1,000	900	800	900
All Other Cooking	6,000	5,400	4,900	5,400
Gas	*1,400*	*1,400*	*1,300*	*1,400*
Electric	*4,100*	*3,500*	*3,200*	*3,600*
Other	*500*	*500*	*400*	*500*
Total Electrical Distribution	**21,700**	**20,000**	**18,100**	**19,900**
Installed Wiring	10,200	9,400	8,200	9,300
Cord, Plug	2,000	1,900	1,700	1,900
Receptacle, Switch	3,000	2,600	2,300	2,600
Lighting	2,900	2,600	2,300	2,600
Other	3,600	3,500	3,500	3,500
Other Selected Equipment	**12,000**	**11,200**	**10,700**	**11,300**
Audio/Visual Equipment	400	400	400	400
Clothes Dryer	7,900	7,300	6,900	7,300
Dishwasher	500	500	600	500
Washing Machine	500	400	400	500
Torch	700	600	700	700
Refrigerator/Freezer	900	900	800	900
Shop/Garden Tool	1,100	1,000	1,000	1,000

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Fire estimates are rounded to the nearest 100. Rounded estimates of fewer than 100 fires are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

[3] There are confined fire estimates included in *Total Residential*, *Total Heating and Cooling Equipment*, *Fireplace, Chimney, Chimney Connector*, *Other*, and *Total Cooking Equipment* categories. These confined fire estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment and power source. See Table 8a on p. 32 for details.

TABLE 1b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
SELECTED EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[4]	**2,230**	**2,410**	**2,230**	**2,290**
Total Heating and Cooling Equipment	**210**	**250**	**230**	**230**
Local Fixed Heater	70	70	80	70
Portable Heater	80	100	60	80
Central Heating	*	*	*	*
Fireplace, Chimney, Chimney Connector	20	40	30	30
Water Heater	*	10	10	10
Air Conditioning	20	20	20	20
Other	50	50	40	40
Total Cooking Equipment	**280**	**240**	**250**	**250**
Range/Oven	180	160	190	180
Gas	*40*	*20*	*40*	*30*
Electric	*140*	*140*	*160*	*150*
Other	*	*	*	*
Microwave Oven	*	*	*	*
All Other Cooking	70	50	20	50
Gas	*10*	*	*10*	*10*
Electric	*60*	*40*	*10*	*40*
Other	*	*	*	*
Total Electrical Distribution	**220**	**220**	**180**	**210**
Installed Wiring	70	60	60	60
Cord, Plug	60	110	70	80
Receptacle, Switch	30	20	*	20
Lighting	20	10	*	10
Other	40	20	40	30
Other Selected Equipment	**20**	**20**	**20**	**20**
Audio/Visual Equipment	*	*	10	*
Clothes Dryer	10	*	*	*
Dishwasher	*	*	*	*
Washing Machine	*	*	*	*
Torch	*	*	*	*
Refrigerator/Freezer	*	20	*	10
Shop/Garden Tool	*	*	*	*

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Death estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude deaths from intentionally set fires.

[4] There were no NFIRS confined fire deaths in 2015, 2016, or 2017.

TABLE 1c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[5]	**10,800**	**10,370**	**10,060**	**10,410**
Total Heating and Cooling Equipment[5]	**870**	**830**	**820**	**840**
Local Fixed Heater	430	390	350	390
Portable Heater	150	150	140	150
Central Heating	20	40	20	30
Fireplace, Chimney, Chimney Connector[6]	50	40	40	40
Water Heater	60	50	60	60
Air Conditioning	60	50	60	60
Other[5]	190	170	150	170
Total Cooking Equipment[5]	**3,650**	**3,370**	**3,150**	**3,390**
Range/Oven	1,780	1,550	1,460	1,590
Gas	*200*	*120*	*160*	*160*
Electric	*1,580*	*1,430*	*1,290*	*1,430*
Other	*	*	*10*	*
Microwave Oven	70	50	70	60
All Other Cooking	390	310	290	330
Gas	*80*	*70*	*60*	*70*
Electric	*280*	*210*	*210*	*240*
Other	*30*	*30*	*20*	*30*
Total Electrical Distribution	**620**	**670**	**510**	**600**
Installed Wiring	210	220	200	210
Cord, Plug	130	110	80	100
Receptacle, Switch	70	90	40	70
Lighting	110	100	50	90
Other	100	150	140	130
Other Selected Equipment	**310**	**380**	**340**	**350**
Audio/Visual Equipment	30	20	20	20
Clothes Dryer	160	210	180	180
Dishwasher	*	20	10	10
Washing Machine	10	10	10	10
Torch	30	20	50	40
Refrigerator/Freezer	40	80	20	50
Shop/Garden Tool	40	30	40	40

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Injury estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude injuries from intentionally set fires.

[5] There are confined fire injury estimates included in *Total Residential*, *Total Heating and Cooling Equipment*, *Fireplace*, *Chimney*, *Chimney Connector*, *Other*, and *Total Cooking Equipment* categories. These confined fire injury estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment. See Table 8b on p. 33 for details.

TABLE 1d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In $Millions[6]) SELECTED EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015 – 2017 Average
Total Residential[7]	**$6,631.0**	**$6,364.9**	**$7,074.0**	**$6,690.0**
Total Heating and Cooling Equipment[7]	**$622.9**	**$619.8**	**$539.8**	**$594.1**
Local Fixed Heater	$149.5	$132.5	$123.2	$135.1
Portable Heater	$101.7	$64.1	$44.4	$70.1
Central Heating	$33.8	$38.3	$23.1	$31.7
Fireplace, Chimney, Chimney Connector[7]	$115.9	$120.9	$110.9	$115.9
Water Heater	$51.2	$37.4	$33.0	$40.5
Air Conditioning	$34.3	$61.5	$67.3	$54.4
Other[7]	$183.2	$200.0	$137.9	$173.7
Total Cooking Equipment[7]	**$707.9**	**$628.3**	**$600.7**	**$645.6**
Range/Oven	$369.5	$346.2	$327.9	$347.9
Gas	*$47.2*	*$40.0*	$42.1	$43.1
Electric	*$321.3*	*$305.3*	$282.8	$303.1
Other	*$1.1*	*$0.9*	$3.0	$1.7
Microwave Oven	$23.8	$20.2	$11.7	$18.6
All Other Cooking	$214.0	$170.9	$157.7	$180.9
Gas	*$86.3*	*$53.8*	$55.7	$65.3
Electric	*$94.5*	*$84.2*	$85.7	$88.1
Other	*$33.1*	*$32.9*	$16.3	$27.4
Total Electrical Distribution	**$639.2**	**$636.0**	**$697.8**	**$657.7**
Installed Wiring	$311.7	$306.9	$234.3	$284.3
Cord, Plug	$65.3	$67.8	$53.3	$62.1
Receptacle, Switch	$68.0	$53.7	$59.3	$60.3
Lighting	$79.1	$82.0	$71.0	$77.4
Other	$115.2	$125.6	$280.0	$173.6
Other Selected Equipment	**$209.6**	**$203.8**	**$317.8**	**$243.7**
Audio/Visual Equipment	$9.7	$7.7	$8.3	$8.6
Clothes Dryer	$92.1	$95.0	$123.2	$103.4
Dishwasher	$15.1	$9.3	$17.0	$13.8
Washing Machine	$4.4	$7.2	$4.6	$5.4
Torch	$22.3	$22.6	$88.4	$44.5
Refrigerator/Freezer	$29.3	$30.7	$33.5	$31.2
Shop/Garden Tool	$36.6	$31.2	$42.8	$36.9

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Property loss estimates are rounded to the nearest tenth of a million dollars. Subtotals do not necessarily add to heading totals. Estimates exclude property loss from intentionally set fires.

[6] The dollar values are not adjusted for inflation.
[7] There are confined fire property loss estimates included in *Total Residential, Total Heating and Cooling Equipment, Fireplace, Chimney, Chimney Connector, Other*, and *Total Cooking Equipment* categories. These confined fire property loss estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment. See Table 8c on p. 33 for details.

TABLE 2a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
SELECTED PRODUCTS, 2015–2017

Product	2015	2016	2017	2015–2017 Average
Total Residential[8]	**370,900**	**351,900**	**362,600**	**361,800**
By Heat Source				
Cigarette, Other Tobacco Products	**10,800**	**10,800**	**10,800**	**10,800**
Candle	**5,800**	**5,300**	**5,600**	**5,500**
Lighter	**1,600**	**1,600**	**1,600**	**1,600**
Match	**400**	**300**	**400**	**400**
By Item First Ignited				
Upholstered Furniture	**4,600**	**4,200**	**4,000**	**4,300**
Smoking Material Ignition	1,200	1,100	900	1,100
Open-Flame Ignition	500	500	500	500
Other[9]	2,800	2,700	2,600	2,700
Mattress, Bedding	**6,900**	**6,500**	**6,500**	**6,700**
Smoking Material Ignition	1,300	1,400	1,400	1,400
Open-Flame Ignition	1,200	1,100	1,100	1,100
Other[9]	4,400	4,100	4,000	4,200
Other Materials				
Cooking Materials[8]	168,600	159,700	166,100	164,800
Electric Cable Insulation	16,700	16,700	17,100	16,800
Interior Wall Covering	6,300	5,800	5,800	6,000
Wearing Apparel-Worn	300	300	300	300
Wearing Apparel-Not Worn	4,800	4,500	4,400	4,600
Floor Covering	3,400	3,300	3,300	3,300
Curtains, Drapes	1,300	1,100	1,100	1,200
Magazines, Newspaper	1,500	1,300	1,400	1,400
Thermal Insulation	5,700	5,300	5,200	5,400
Cabinet, Desk	4,700	4,300	4,300	4,400
Trash, Rubbish[7]	22,300	22,300	25,300	23,300
Toy, Game	200	200	300	200
Box, Carton, Bag, Basket, Barrel	2,700	2,700	2,900	2,800

Source: U. S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Fire estimates are rounded to the nearest 100. Subtotals do not necessarily add up to heading totals.
Estimates exclude intentionally set fires.

[8] There are confined fire estimates included in *Total Residential, Cooking Materials,* and *Trash, Rubbish* categories. Estimates for confined cooking fires are included in the *Cooking Materials* fire losses because cooking materials are most likely the item first ignited. See Table 8a on p. 32 for details.

[9] The Other category for "Upholstered Furniture" and "Mattress, Bedding" includes all fires where the heat source was neither smoking material, nor open flame. These other heat sources include electrical arcing fires, space heater fires, and more.

TABLE 2b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
SELECTED PRODUCTS, 2015–2017

Product	2015	2016	2017	2015–2017 Average
Total Residential[10]	**2,230**	**2,410**	**2,230**	**2,290**
By Heat Source				
Cigarette, Other Tobacco Products	**530**	**670**	**550**	**580**
Candle	**60**	**70**	**110**	**80**
Lighter	**40**	**80**	**30**	**50**
Match	*****	*****	**40**	**10**
By Item First Ignited				
Upholstered Furniture	**510**	**370**	**290**	**390**
Smoking Material Ignition	300	220	130	220
Open-Flame Ignition	30	40	20	30
Other	180	120	140	140
Mattress, Bedding	**270**	**360**	**340**	**320**
Smoking Material Ignition	180	250	180	200
Open-Flame Ignition	10	20	30	20
Other	80	90	120	100
Other Materials				
Cooking Materials	200	210	200	200
Electric Cable Insulation	110	90	100	100
Interior Wall Covering	80	90	80	80
Wearing Apparel-Worn	90	90	90	90
Wearing Apparel-Not Worn	30	80	50	50
Floor Covering	60	130	50	80
Curtains, Drapes	10	10	20	10
Magazines, Newspaper	20	40	50	40
Thermal Insulation	*	*	10	*
Cabinet, Desk	20	20	40	30
Trash, Rubbish	20	60	70	50
Toy, Game	*	*	10	*
Box, Carton, Bag, Basket, Barrel	*	30	20	20

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Death estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude deaths from intentionally set fires.

[10] There were no NFIRS confined fire deaths in 2015, 2016, or 2017.

TABLE 2c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED PRODUCTS, 2015–2017

Product	2015	2016	2017	2015–2017 Average
Total Residential[11]	**10,800**	**10,370**	**10,060**	**10,410**
By Heat Source				
Cigarette, Other Tobacco Products	**850**	**920**	**880**	**880**
Candle	**540**	**600**	**470**	**540**
Lighter	**230**	**220**	**240**	**230**
Match	**40**	**30**	**50**	**40**
By Item First Ignited				
Upholstered Furniture	**710**	**570**	**490**	**590**
Smoking Material Ignition	250	260	130	210
Open-Flame Ignition	90	50	90	80
Other	370	270	270	300
Mattress, Bedding	**910**	**860**	**950**	**910**
Smoking Material Ignition	280	310	340	310
Open-Flame Ignition	160	180	160	160
Other	470	370	450	430
Other Materials				
Cooking Materials[11]	3,600	3,440	3,210	3,420
Electric Cable Insulation	440	330	360	380
Interior Wall Covering	260	260	190	240
Wearing Apparel-Worn	100	160	90	120
Wearing Apparel-Not Worn	190	290	240	240
Floor Covering	140	140	150	140
Curtains, Drapes	100	90	50	80
Magazines, Newspaper	110	70	100	90
Thermal Insulation	70	40	80	60
Cabinet, Desk	290	220	270	260
Trash, Rubbish[12]	240	270	210	240
Toy, Game	10	30	20	20
Box, Carton, Bag, Basket, Barrel	140	140	110	130

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Injury estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude injuries from intentionally set fires.

[11] There are confined fire injury estimates included in *Total Residential*, *Cooking Materials,* and *Trash, Rubbish* categories. Estimates for confined cooking fire injuries are included in the *Cooking Materials* fire losses because cooking materials are most likely the item first ignited. See Table 8b on p. 33 for details.

TABLE 2d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In $Millions[12]) SELECTED PRODUCTS, 2015–2017

Product	2015	2016	2017	2015–2017 Average
Total Residential[13]	**$6,631.0**	**$6364.9**	**$7,074.0**	**$6,690.0**
By Heat Source				
Cigarette, Other Tobacco Products	**$392.9**	**$410.5**	**$421.3**	**$408.3**
Candle	**$241.5**	**$170.1**	**$227.9**	**$213.2**
Lighter	**$57.3**	**$57.1**	**$93.6**	**$69.3**
Match	**$17.0**	**$15.5**	**$22.7**	**$18.4**
By Item First Ignited				
Upholstered Furniture	**$263.9**	**$204.7**	**$202.6**	**$223.7**
Smoking Material Ignition	$69.9	$52.6	$48.2	$56.9
Open-Flame Ignition	$27.7	$26.2	$39.1	$31.0
Other	$166.2	$125.9	$115.2	$135.8
Mattress, Bedding	**$221.8**	**$235.5**	**$252.7**	**$236.7**
Smoking Material Ignition	$37.7	$54.3	$52.5	$48.2
Open-Flame Ignition	$42.2	$41.8	$44.0	$42.7
Other	$141.9	$139.3	$156.2	$145.8
Other Materials				
Cooking Materials[13]	$485.4	$478.2	$551.1	$504.9
Electric Cable Insulation	$438.0	$463.9	$490.7	$464.2
Interior Wall Covering	$283.5	$259.7	$273.8	$272.3
Wearing Apparel-Worn	$2.3	$14.5	$7.6	$8.1
Wearing Apparel-Not Worn	$110.0	$107.3	$111.3	$109.5
Floor Covering	$106.2	$122.5	$113.8	$114.2
Curtains, Drapes	$53.7	$40.7	$40.3	$44.9
Magazines, Newspaper	$45.5	$43.4	$44.7	$44.5
Thermal Insulation	$167.5	$179.4	$144.0	$163.6
Cabinet, Desk	$173.8	$155.6	$150.6	$160.0
Trash, Rubbish[14]	$162.6	$156.3	$359.7	$226.2
Toy, Game	$2.9	$8.2	$12.5	$7.9
Box, Carton, Bag, Basket, Barrel	$98.2	$84.6	$98.7	$93.8

Source: U. S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Property loss estimates are rounded to the nearest tenth of a million dollars. Subtotals do not necessarily add to heading totals. Estimates exclude property loss from intentionally set fires.

[12] Dollar values are not adjusted for inflation.

[13] There are confined fire property loss estimates included in *Total Residential, Cooking Materials,* and *Trash, Rubbish* categories. Estimates for confined cooking fire property losses are included in the *Cooking Materials* fire losses because cooking materials are most likely the item first ignited. See Table 8c on p. 33 for details.

TABLE 3a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
HEATING AND COOLING EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[14]	**370,900**	**351,900**	**362,600**	**361,800**
Total Heating and Cooling Equipment[14]	**47,000**	**41,300**	**39,600**	**42,600**
Solid Fuel	**2,200**	**2,200**	**2,200**	**2,200**
Fixed Heater	500	500	500	500
Portable Heater	*	*	*	*
Fireplace, Chimney, Chimney Connector	1,600	1,600	1,600	1,600
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	100	*	*
Gas-Fired	**3,000**	**2,600**	**2,600**	**2,700**
Fixed Heater	1,000	800	900	900
Portable Heater	200	200	200	200
Fireplace, Chimney, Chimney Connector	200	200	200	200
Central Heating	400	400	300	400
Water Heater	1,000	800	800	900
Fixed, Central Air Conditioning	*	*	*	*
Other	300	200	200	200
Electric	**14,600**	**13,900**	**12,700**	**13,700**
Fixed Heater	3,600	3,500	3,400	3,500
Portable Heater	1,500	1,300	1,100	1,300
Central Heating	500	400	400	400
Water Heater	900	900	800	900
Fixed, Central Air Conditioning	1,200	1,200	1,000	1,100
Portable Air Conditioner	500	500	400	500
Other	6,400	6,000	5,600	6,000
Liquid Fuel	**400**	**300**	**300**	**300**
Fixed Heater	100	*	*	*
Portable Heater	200	200	200	200
Fireplace, Chimney, Chimney Connector	*	*	*	*
Central Heating	100	100	100	100
Water Heater	*	*	*	*
Other	*	*	*	*
All Other Fuel	**100**	**100**	**100**	**100**

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Fire estimates are rounded to the nearest 100. Rounded estimates less than 100 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

[14] There are confined fire estimates included in *Total Residential,* and *Total Heating and Cooling Equipment* categories. These confined fire estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment or the power source of the equipment. See Table 8a on p. 32 for details.

TABLE 3b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
HEATING AND COOLING EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[15]	**2,230**	**2,410**	**2,230**	**2,290**
Total Heating and Cooling Equipment	**210**	**250**	**230**	**230**
Solid Fuel	**50**	**60**	**60**	**50**
Fixed Heater	40	10	50	30
Portable Heater	*	10	*	*
Fireplace, Chimney, Chimney Connector	10	20	10	10
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	*	*	*
Gas-Fired	**20**	**30**	**50**	**30**
Fixed Heater	10	20	20	10
Portable Heater	*	*	*	*
Fireplace, Chimney, Chimney Connector	*	10	20	10
Central Heating	*	*	*	*
Water Heater	*	10	*	*
Fixed, Central Air Conditioning	*	*	*	*
Other	*	*	*	*
Electric	**110**	**140**	**110**	**120**
Fixed Heater	10	10	10	10
Portable Heater	50	90	50	60
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Fixed, Central Air Conditioning	10	10	*	10
Portable Air Conditioner	10	*	*	10
Other	40	20	30	30
Liquid Fuel	**20**	**20**	**10**	**20**
Fixed Heater	*	10	*	*
Portable Heater	20	*	10	10
Fireplace, Chimney, Chimney Connector	*	*	*	*
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	10	*	*
All Other Fuel	*	*	*	*

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Death estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude deaths from intentionally set fires.

[15] There were no NFIRS confined fire deaths in 2015, 2016, or 2017.

TABLE 3c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
HEATING AND COOLING EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[16]	**10,800**	**10,370**	**10,060**	**10,410**
Total Heating and Cooling Equipment[16]	**870**	**830**	**820**	**840**
Solid Fuel	**50**	**40**	**50**	**50**
Fixed Heater	20	30	20	20
Portable Heater	*	*	*	*
Fireplace, Chimney, Chimney Connector	20	20	20	20
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	10	*	*	*
Gas-Fired	**200**	**120**	**120**	**140**
Fixed Heater	110	60	40	70
Portable Heater	10	*	10	10
Fireplace, Chimney, Chimney Connector	10	10	10	10
Central Heating	20	20	10	10
Water Heater	50	30	40	40
Fixed, Central Air Conditioning	*	*	*	*
Other	*	10	10	10
Electric	**550**	**600**	**500**	**550**
Fixed Heater	250	260	250	250
Portable Heater	90	110	90	100
Central Heating	*	10	10	10
Water Heater	10	10	10	10
Fixed, Central Air Conditioning	30	40	40	30
Portable Air Conditioner	30	10	20	20
Other	130	150	90	130
Liquid Fuel	**30**	**50**	**30**	**40**
Fixed Heater	*	10	*	*
Portable Heater	30	30	30	30
Fireplace, Chimney, Chimney Connector	*	*	*	*
Central Heating	*	10	*	*
Water Heater	*	*	*	*
Other	*	*	*	*
All Other Fuel	*****	*****	*****	*****

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Injury estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude injuries from intentionally set fires.

[16] There are confined fire injury estimates included in *Total Residential*, and *Total Heating and Cooling Equipment* categories. These confined fire injury estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment or the power source of the equipment. See Table 8b on p. 33 for details.

TABLE 3d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In $Millions[17]) HEATING AND COOLING EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[18]	**$6,631.0**	**$6,364.9**	**$7,074.0**	**$6,690.0**
Total Heating and Cooling Equipment[18]	**$622.9**	**$619.8**	**$539.8**	**$594.1**
Solid Fuel	**$129.9**	**$110.1**	**$108.4**	**$116.2**
Fixed Heater	$31.2	$23.8	$25.9	$27.0
Portable Heater	$0.5	$0.3	$0.3	$0.4
Fireplace, Chimney, Chimney Connector	$95.9	$81.3	$78.9	$85.4
Central Heating	$1.0	$1.2	$1.7	$1.3
Water Heater	*	*	*	*
Other	$1.3	$3.5	$1.6	$2.1
Gas-Fired	**$111.0**	**$93.5**	**$100.9**	**$101.8**
Fixed Heater	$22.1	$22.3	$26.8	$23.7
Portable Heater	$30.1	$5.3	$3.8	$13.0
Fireplace, Chimney, Chimney Connector	$8.0	$15.7	$25.3	$16.3
Central Heating	$12.4	$21.2	$8.2	$13.9
Water Heater	$31.9	$21.1	$22.9	$25.3
Fixed, Central Air Conditioning	$0.2	*	$0.3	$0.2
Other	$6.2	$7.8	$13.4	$9.1
Electric	**$359.6**	**$392.4**	**$306.2**	**$352.7**
Fixed Heater	$72.8	$63.7	$68.2	$68.2
Portable Heater	$51.0	$50.4	$35.1	$45.5
Central Heating	$14.6	$9.5	$8.1	$10.7
Water Heater	$13.6	$11.9	$9.9	$11.8
Fixed, Central Air Conditioning	$22.7	$29.7	$26.2	$26.2
Portable Air Conditioner	$36.2	$61.5	$40.2	$45.9
Other	$148.8	$165.7	$118.6	$144.3
Liquid Fuel	**$12.4**	**$8.4**	**$12.0**	**$10.9**
Fixed Heater	$2.0	$0.8	$1.5	$1.4
Portable Heater	$7.6	$5.1	$5.0	$5.9
Fireplace, Chimney, Chimney Connector	$0.5	$0.5	$0.5	$0.5
Central Heating	$1.1	$1.7	$4.9	$2.6
Water Heater	*	*	*	*
Other	$1.2	$0.3	*	$0.5
All Other Fuel	**$1.4**	**$7.4**	**$1.1**	**$3.3**

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Property loss estimates are rounded to the nearest tenth of a million dollars. Rounded estimates less than $0.1m are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude property loss from intentionally set fires.

[17] Dollar values are not adjusted for inflation.
[18] There are confined fire property loss estimates included in *Total Residential,* and *Total Heating and Cooling Equipment* categories. These confined fire property loss estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment or the power source of the equipment. See Table 8c on p. 33 for details.

TABLE 4a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
SELECTED ELECTRICAL EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[19]	**370,900**	**351,900**	**362,600**	**361,800**
Total Electrical	**73,900**	**67,800**	**61,900**	**67,900**
Electric Heating and Cooling	**14,600**	**13,900**	**12,700**	**13,700**
Central Heating	500	400	400	400
Local Fixed Heater	3,600	3,500	3,400	3,500
Portable Heater	1,500	1,300	1,100	1,300
Water Heater	900	900	800	900
Fixed, Central Air Conditioning	1,200	1,200	1,000	1,100
Portable Air Conditioner	500	500	400	500
Other	6,400	6,000	5,600	6,000
Electric Cooking Equipment	**22,300**	**19,400**	**17,700**	**19,800**
Range/Oven	17,200	15,100	13,700	15,300
Range/Oven Hood	200	200	200	200
Deep Fat Fryer	100	100	100	100
Grill	*	*	*	*
Microwave Oven	1,000	900	800	900
Small Heat-Producing Appliance	1,100	900	800	900
Other	2,600	2,200	2,000	2,300
Electrical Distribution	**22,300**	**24,000**	**18,400**	**21,600**
Installed Wiring	10,100	9,400	8,200	9,200
Light Fixture	2,000	1,800	1,600	1,800
Receptacle, Switch	3,000	2,600	2,300	2,600
Cord, Plug	2,000	1,900	1,700	1,900
Lamp, Light Bulb	900	800	700	800
Panel Board	800	800	700	800
Meter	600	600	500	600
Transformer	100	100	100	100
Other	2,700	2,500	2,600	2,600
Other Selected Electrical Appliances	**8,500**	**8,100**	**7,700**	**8,100**
Clothes Dryer	5,800	5,400	5,100	5,400
Dishwasher	500	500	600	500
Audio/Visual Equipment	400	400	400	400
Washing Machine	500	400	400	400
Refrigerator/Freezer	900	900	800	900
Shop/Garden Tools	300	400	300	300
Torch	100	100	100	100

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Fire estimates are rounded to the nearest 100. Rounded estimates less than 100 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

[19] There are confined fire estimates included in the *Total Residential* category. These confined fire estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment or the power source of the equipment. See Table 8a on p. 32 for details.

TABLE 4b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
SELECTED ELECTRICAL EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[20]	**2,230**	**2,410**	**2,230**	**2,290**
Total Electrical	**670**	**700**	**610**	**660**
Electric Heating and Cooling	**110**	**140**	**110**	**120**
Central Heating	*	*	*	*
Local Fixed Heater	10	10	10	10
Portable Heater	50	90	50	60
Water Heater	*	*	*	*
Fixed, Central Air Conditioning	10	10	*	10
Portable Air Conditioner	10	*	10	10
Other	40	20	30	30
Electric Cooking Equipment	**210**	**180**	**170**	**190**
Range/Oven	140	140	160	150
Range/Oven Hood	*	*	*	*
Deep Fat Fryer	*	*	*	*
Grill	*	*	*	*
Microwave Oven	*	*	*	*
Small Heat-Producing Appliance	30	10	10	20
Other	30	30	*	20
Electrical Distribution	**220**	**240**	**160**	**210**
Installed Wiring	70	60	60	60
Light Fixture	10	10	*	10
Receptacle, Switch	30	20	*	20
Cord, Plug	60	110	70	80
Lamp, Light Bulb	*	*	*	*
Panel Board	*	10	*	*
Meter	*	*	*	*
Transformer	*	*	*	*
Other	40	20	30	30
Other Selected Electrical Appliances	**10**	**20**	**10**	**10**
Clothes Dryer	10	*	*	*
Dishwasher	*	*	*	*
Audio/Visual Equipment	*	*	10	*
Washing Machine	*	*	*	*
Refrigerator/Freezer	*	20	*	10
Shop/Garden Tool	*	*	*	*
Torch	*	*	*	*

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Death estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude deaths from intentionally set fires.

[20] There were no NFIRS confined fire deaths in 2015, 2016, or 2017.

TABLE 4c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED ELECTRICAL EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[21]	**10,800**	**10,370**	**10,060**	**10,410**
Total Electrical	**3,740**	**3,570**	**2,940**	**3,410**
Electric Heating and Cooling	**550**	**600**	**500**	**550**
Central Heating	*	10	10	10
Local Fixed Heater	250	260	250	250
Portable Heater	90	110	90	100
Water Heater	10	10	10	10
Fixed, Central Air Conditioning	30	40	40	30
Portable Air Conditioner	30	10	20	20
Other	130	150	90	130
Electric Cooking Equipment	**1,940**	**1,690**	**1,390**	**1,670**
Range/Oven	1,580	1,430	1,150	1,390
Range/Oven Hood	10	20	*	10
Deep Fat Fryer	10	*	10	10
Grill	*	*	*	*
Microwave Oven	70	50	60	60
Small Heat-Producing Appliance	100	60	70	80
Other	170	130	100	130
Electrical Distribution	**630**	**830**	**440**	**630**
Installed Wiring	210	220	180	200
Light Fixture	70	50	30	50
Receptacle, Switch	70	90	40	60
Cord, Plug	130	110	70	100
Lamp, Light Bulb	40	50	10	40
Panel Board	10	30	*	20
Meter	*	10	10	*
Transformer	*	10	*	*
Other	100	100	90	100
Other Selected Electrical Appliances	**190**	**260**	**200**	**220**
Clothes Dryer	90	130	110	110
Dishwasher	*	20	10	10
Audio/Visual Equipment	30	20	20	20
Washing Machine	10	10	10	10
Refrigerator/Freezer	40	80	20	50
Shop/Garden Tool	10	*	10	10
Torch	*	*	10	10

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Injury estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude injuries from intentionally set fires.

[21] There are confined fire injury estimates included in the *Total Residential* category. These confined fire injury estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment or the power source of the equipment. See Table 8b on p. 33 for details.

TABLE 4d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In $Millions[22]) SELECTED ELECTRICAL EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[23]	**$6,631.0**	**$6,364.9**	**$7,074.0**	**$6,690.0**
Total Electrical	**$1,839.2**	**$1,790.7**	**$1,582.9**	**$1,737.6**
Electric Heating and Cooling	**$359.6**	**$392.4**	**$306.2**	**$352.7**
Central Heating	$14.6	$9.5	$8.1	$10.7
Local Fixed Heater	$72.8	$63.7	$68.2	$68.2
Portable Heater	$51.0	$50.4	$35.1	$45.5
Water Heater	$13.6	$11.9	$9.9	$11.8
Fixed, Central Air Conditioning	$22.7	$29.7	$26.2	$26.2
Portable Air Conditioner	$36.2	$61.5	$40.2	$45.9
Other	$148.8	$165.7	$118.6	$144.3
Electric Cooking Equipment	**$443.9**	**$409.3**	**$374.4**	**$409.2**
Range/Oven	$321.3	$305.3	$281.1	$302.6
Range/Oven Hood	$3.8	$1.9	$2.9	$2.8
Deep Fat Fryer	$3.0	$5.4	$2.4	$3.6
Grill	$1.1	$1.2	$1.4	$1.2
Microwave Oven	$23.8	$20.3	$11.5	$18.5
Small Heat-Producing Appliance	$27.7	$20.9	$29.3	$25.9
Other	$63.3	$54.4	$45.9	$54.5
Electrical Distribution	**$644.5**	**$643.6**	**$533.0**	**$607.0**
Installed Wiring	$310.6	$306.9	$232.9	$283.5
Light Fixture	$55.9	$54.5	$55.1	$55.2
Receptacle, Switch	$67.8	$53.7	$58.9	$60.1
Cord, Plug	$65.3	$67.8	$53.0	$62.0
Lamp, Light Bulb	$21.6	$27.3	$15.4	$21.4
Panel Board	$20.6	$23.9	$15.4	$20.0
Meter	$11.2	$14.9	$14.3	$13.5
Transformer	$3.0	$1.5	$1.3	$1.9
Other	$88.7	$93.0	$86.7	$89.4
Other Selected Electrical Appliances	**$144.5**	**$134.3**	**$174.9**	**$151.2**
Clothes Dryer	$71.6	$70.7	$100.4	$80.9
Dishwasher	$15.1	$9.3	$16.9	$13.8
Audio/Visual Equipment	$9.7	$7.7	$8.2	$8.5
Washing Machine	$4.2	$7.0	$4.5	$5.2
Refrigerator/Freezer	$29.1	$30.7	$33.1	$31.0
Shop/Garden Tool	$10.9	$6.2	$9.4	$8.8
Torch	$3.8	$2.6	$2.4	$2.9

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Estimates are rounded to the $0.1m. Rounded estimates less than $0.1m are denoted by an asterisk (*).
Subtotals do not necessarily add to heading totals. Estimates exclude property loss from intentionally set fires.

[22] Dollar values were not adjusted for inflation.

[23] There are confined fire property loss estimates included in the *Total Residential* category. These confined fire property loss estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment or the power source of the equipment. See Table 8c on p. 33 for details.

TABLE 5a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
SELECTED GAS-FIRED EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[24]	**370,900**	**351,900**	**362,200**	**361,800**
Total Gas-Fired Equipment	**11,100**	**10,000**	**9,900**	**10,300**
Gas Heating Equipment	**3,000**	**2,600**	**2,600**	**2,700**
Fixed Heater	1,000	800	900	900
Portable Heater	200	200	200	200
Central Heating	400	400	300	400
Fireplace, Chimney, Connector	200	200	200	200
Water Heater	1,000	800	800	900
Fixed, Central Air Conditioning	*	*	*	*
Other	300	200	200	200
Gas Cooking Equipment	**3,900**	**3,500**	**3,600**	**3,700**
Range/Oven	2,700	2,200	2,300	2,400
Open Gas Grill	700	800	700	700
Other	600	500	500	500
Other Selected Gas Equipment	**2,500**	**2,300**	**2,200**	**2,400**
Clothes Dryer	1,600	1,500	1,400	1,500
Torch	500	400	500	500
Shop/Garden Tool	500	400	400	400

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Fire estimates are rounded to the nearest 100. Rounded estimates less than 100 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude losses from intentionally set fires.

[24] There are confined fire estimates included in the *Total Residential* category. These confined fire estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment or the power source of the equipment. See Table 8a on p. 32 for details.

TABLE 5b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
SELECTED GAS-FIRED EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[25]	**2,230**	**2,410**	**2,230**	**2,290**
Total Gas-Fired Equipment	**80**	**70**	**130**	**90**
Gas Heating Equipment	**20**	**30**	**50**	**30**
Fixed Heater	10	20	20	10
Portable Heater	*	*	*	*
Central Heating	*	*	*	*
Fireplace, Chimney, Connector	*	10	20	10
Water Heater	*	10	*	*
Fixed, Central Air Conditioning	*	*	*	*
Other	*	*	*	*
Gas Cooking Equipment	**40**	**20**	**40**	**40**
Range/Oven	*	20	40	30
Open Gas Grill	*	*	*	*
Other	*	*	*	*
Other Selected Gas Equipment	**10**	*	*	*
Clothes Dryer	*	*	*	*
Torch	*	*	*	*
Shop/Garden Tool	*	*	*	*

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Death estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude deaths from intentionally set fires.

[25]There were no NFIRS confined fire deaths in 2015, 2016, or 2017.

TABLE 5c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED GAS-FIRED EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[26]	**10,800**	**10,370**	**10,060**	**10,410**
Total Gas-Fired Equipment	**670**	**500**	**490**	**550**
Gas Heating Equipment	**200**	**120**	**120**	**140**
Fixed Heater	110	60	40	70
Portable Heater	10	*	10	10
Central Heating	20	20	10	10
Fireplace, Chimney, Connector	10	10	10	10
Water Heater	50	30	40	40
Fixed, Central Air Conditioning	*	*	*	*
Other	*	10	10	10
Gas Cooking Equipment	**260**	**180**	**190**	**210**
Range/Oven	200	120	140	150
Open Gas Grill	50	40	20	40
Other	20	20	20	20
Other Selected Gas Equipment	**100**	**80**	**60**	**80**
Clothes Dryer	50	50	30	40
Torch	30	10	30	20
Shop/Garden Tool	20	20	10	10

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Injury estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude injuries from intentionally set fires.

[26] There are confined fire injury estimates included in the *Total Residential* category. These confined fire injury estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment or the power source of the equipment. See Table 8b on p. 33 for details.

TABLE 5d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In $Millions[27]) SELECTED GAS-FIRED EQUIPMENT, 2015–2017

Equipment	2015	2016	2017	2015–2017 Average
Total Residential[28]	**$6,631.0**	**$6,364.9**	**$7,074.0**	**$6,690.0**
Total Gas-Fired Equipment	**$355.1**	**$309.0**	**$394.3**	**$352.8**
Gas Heating Equipment	**$111.0**	**$93.5**	**$100.9**	**$101.8**
Fixed Heater	$22.1	$22.3	$26.8	$23.7
Portable Heater	$30.1	$5.3	$3.8	$13.0
Central Heating	$12.4	$21.2	$8.2	$13.9
Fireplace, Chimney, Connector	$8.0	$15.7	$25.3	$16.3
Water Heater	$31.9	$21.1	$22.9	$25.3
Fixed, Central Air Conditioning	$0.2	*	$0.3	$0.2
Other	$6.2	$7.8	$13.4	$9.1
Gas Cooking Equipment	**$127.0**	**$90.2**	**$93.6**	**$103.6**
Range/Oven	$47.2	$40.0	$41.8	$43.0
Open Gas Grill	$64.9	$35.4	$32.7	$44.4
Other	$14.9	$14.8	$19.0	$16.2
Other Selected Gas Equipment	**$42.1**	**$44.3**	**$119.7**	**$68.7**
Clothes Dryer	$13.4	$16.6	$14.6	$14.9
Torch	$15.1	$18.5	$83.8	$39.1
Shop/Garden Tool	$13.7	$9.1	$21.3	$14.7

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Property loss estimates are rounded to the nearest tenth of a million dollars. Rounded estimates less than $0.1m are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude property loss from intentionally set fires.

[27] Dollar values are not adjusted for inflation.
[28] There are confined fire property loss estimates included in the *Total Residential* category. These confined fire property loss estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment or the power source of the equipment. See Table 8c on p. 33 for details.

Methodology

The Methodology section is divided into five major sections. Section 1 describes the data from which fire loss estimates were derived. Section 2 describes the procedures for preparing the data and dealing with missing data. Section 3 describes the quality-control checking and correction of the data. Section 4 describes how the fire loss estimates were made. Section 5 describes other issues that relate to the data and the estimates.

Data

Sources of Data for Fire Loss Estimates

The estimates in this report are based on the National Fire Protection Association's (NFPA) Survey of Fire Departments and the U.S. Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS) data.

The NFPA survey is a stratified random sample of fire departments in the United States.[29] The sample is stratified by the size of the community protected. The NFPA makes national estimates of aggregated fires, deaths, injuries, and property loss, by weighting sample results according to the proportion of the total U.S. population accounted for, by communities of each size. The table below shows the NFPA estimates of residential structure fires and the associated losses for 2015 through 2017.

Table 6. NFPA Estimates of Residential Structure Fires and Associated Losses 2015–2017

	2015	2016	2017
Structure Fires	388,000	371,500	379,000
Civilian Deaths	2,605	2,800	2,710
Civilian Injuries	11,575	11,125	10,910
Property Loss	$7.21 billion	$7.42 billion	$7.90 billion

Source: See first footnote below.

The table above contains the only data from the NFPA survey that CPSC staff uses to make fire loss estimates.

NFIRS compiles incident reports submitted voluntarily to the U.S. Fire Administration (USFA) by U.S. fire departments. Thus, NFIRS is not a probability sample and is insufficient to support precision estimation. The reports come from all 50 states, the District of Columbia, and U.S. territories in each of 2015, 2016, and 2017. Not all the states reporting included data from every fire department in the state. The number of fire departments participating in NFIRS increased from 22,610 in 2015, to 23,120 in 2016, and then dropped to 22,823 in 2017. Table 7 shows the number of residential structure fires and the corresponding losses reported to USFA from 2015 through 2017.

[29] Hylton Haynes, "Fire Loss in the U.S. During 2014," National Fire Protection Association (NFPA), September 2015; Hylton Haynes, "Fire Loss in the U.S. During 2015," National Fire Protection Association (NFPA), September 2016; Ben Evarts, "Fire Loss in the U.S. During 2016," National Fire Protection Association (NFPA), September 2017.

Table 7. Residential Structure Fires and Associated Losses Reported to NFIRS 2015–2017

	2015	2016	2017
Structure Fires	269,521	270,186	262,847
Civilian Deaths	1,503	1,607	1,590
Civilian Injuries	6,872	6,595	6,422
Property Loss	$4.46 billion	$4.87 billion	$4.80 billion

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA.

According to NFPA, there was an estimated annual average of 379,500 residential structure fires in the United States during 2015 to 2017, and an annual average of 2,710 deaths, 11,200 injuries, and $7.5 billion in property losses. NFIRS captured about 70 percent of these fires, 58 percent of the deaths, 59 percent of the injuries, and 66 percent of the property losses (Table 7).

NFIRS Variables

The NFIRS version 5.0 coding system includes many variables, but CPSC staff used only a few for this report. The list of variables CPSC staff used for this report is shown below:

Variable	Description
Civilian Deaths	Number of people who died in connection with the fire Incident other than fire service personnel.
Civilian Injuries	Number of people who were injured (but did not die) in connection with the fire incident, other than fire service personnel.
Property Loss	Estimate of loss, in whole dollars, if structure sustained damage from flame, smoke, or suppression efforts. Property loss is not adjusted for inflation.
Contents Loss	Estimate of loss, in whole dollars for contents (which had value) that sustained damage from flame, smoke, suppression efforts, or otherwise. Content losses are not adjusted for inflation.
Property Use	Refers to the specific use of the property where the incident occurred. For residential structure fires, the properties that were deemed appropriate were single/ multifamily dwellings, any type of boarding houses, dormitories, sorority/fraternity houses, hotels/motels, and mobile property not in transit.

Incident Type	Identifies the various types of incidents to which fire departments respond. It may include fires, rescue and emergency medical services, false alarms. For this report, the incident codes of interest included structure fires (which include confined fires) and fires in mobile and portable structures used as fixed residences.
Equipment Involved	Device that provided the heat that started the fire (*e.g.*, heater, clothes dryer).
Power Source	The type of power for the equipment involved in the fire's ignition. These are grouped into electrical, gas-fueled, liquid-fueled, solid-fueled, and other.
Equipment Portability	Identifies the equipment involved as stationary or portable.
Heat Source	Source of heat that ignited the fire (*e.g.*, candle, lighter, cigarette, heat from operating equipment, hot object).
Item First Ignited	The functional description or use of the item that was first ignited by the heat source (*e.g.*, upholstered furniture, mattress, bedding, electric cable insulation, curtains or drapes).
Cause of Ignition	The general causal factor that resulted in a heat source igniting a combustible material. The cause code values are: 1: intentional 2: unintentional 3: failure of equipment or heat source 4: act of nature 5: cause under investigation 0: cause, other U: cause undetermined after investigation. CPSC staff regrouped the codes as: 1: intentional 0, 2, 3, 4 or fire involving child play unintentional 5, U, missing information: unknown.

The NFIRS coding manual defines some variables as "required fields." A "required field" means that, if known, a value must be supplied for that variable. Other variables may or may not be supplied at the discretion of the reporting department. In the list above, the categories Equipment Involved, Power Source, and Equipment Portability are not required fields. Variables that are not required are more likely to be missing from a given fire incident report in NFIRS than those that are required.[30]

[30] NFIRS Complete Reference Guide, January 2015.

In a change that was incorporated by USFA beginning with 2012 data, Equipment Involved became required if certain Heat Source codes were entered. This change led to a smaller proportion of missing data and higher estimates for certain products. As such, starting with the 2012 estimates, CPSC staff deemed it appropriate to make an adjustment because the large increase in estimates for certain products (if no adjustment was made) was a function of the new rule, and not a function of an increase in actual fires for those products. See "2011 – 2013 Residential Fire Loss Estimates" (Miller, June 2016), for an in-depth discussion on this topic.

Beginning in 2015, Equipment Involved reverted to not being a required field, no matter what Heat Source is coded. Following suit, CPSC staff also chose to stop making the adjustments beginning with the 2015 data. However, the large increase in estimates for particular products, which were expected to disappear with the return to pre-2012 coding requirements, lingered to a certain extent. Staff understands that this is likely, to a large degree, to be a function of the change in coding behavior that was necessitated by the 2012 coding change.

In 2009 through 2011, 48.7 percent of NFIRS nonconfined residential structure fires had an Equipment Involved in Ignition that was left blank or was coded as "UUU – Equipment involved in ignition undetermined." In 2012 through 2014, that proportion dropped to 36.0 percent. In 2015, it was 41.3 percent; in 2016, it was 43.4 percent; and in 2017, it rose to 47.8 percent, which is nearly the pre-2012 level. Parallel to this, in 2009 through 2011, 2.5 percent of NFIRS nonconfined residential structure fires had an Equipment Involved in Ignition coded between 200 and 263, which are the codes for "Electrical Distribution, Lighting and Power Transfer." In 2012 through 2014, with the new coding requirement that Equipment Involved in Ignition be coded for fires with certain Heat Source codes (including '13 – Arcing'), the proportion of fires with an Equipment Involved in Ignition code between 200 and 263 jumped to 8.0 percent. In 2015, the proportion dropped to 6.6 percent; in 2016, it was 6.0 percent; and in 2017, it was 5.1 percent. The proportion coded as Electrical Distribution is decreasing as the unknowns rise.

Similar changes are observed in various other equipment categories. For example, the proportion of fires in "Heating and Cooling, Electrical Distribution," and in "Kitchen and Cooking Equipment" were much higher in 2012 through 2014, than before 2012. The proportion declined slightly in 2015, but not back to pre-2012 levels. The proportion declined slightly again in 2016, and continued to decline in 2017. The decline seen for many estimates in Tables 1, 3, 4, and 5, could largely be a function of this return to pre-2012 coding behavior, rather than a real decrease in fires and associated losses.

Data Preparation—Addressing Different Types of Missing Data

There are four general types of missing data in NFIRS: (1) data where the value of the missing variable can be inferred logically; (2) missing data from exposure fires; (3) missing data from confined fires; and (4) other missing data. Standard practice, in analysis of fire data over the last 20 years or so, has been to fill in the missing values whenever possible.

Missing data that can be logically inferred

As mentioned, only a few of the available fire incident characteristics were used to generate estimates in this report. Of these, only the variables Incident Type, Property Use, Cause of Ignition, Item First Ignited, Heat Source, and the Loss[31] variables are required to be filled out by the fire departments. Even fewer are required for confined fires, which will be discussed below. Tables 1, 3, 4, and 5 in this report rely heavily on the variables Equipment Involved and Equipment Power Source. To reduce the extent of missing data,

[31] These are property loss and content loss which CPSC staff add together for what they call property loss.

CPSC staff has implemented some conventions, as necessary, after consulting with USFA technical staff. For example, if the heat source is known to be matches, lighters, or candles, and no equipment is reported, then it is likely that equipment was not involved, rather than equipment being unknown. Similarly, if the factor contributing to the ignition of a fire is reported to be an act of nature—such as an earthquake or a storm—and no equipment is reported, then it is likely that no equipment was involved.

In another scenario, the reported equipment code is electrical, but the Equipment Power Source is missing. It is evident that the power source should have been reported as electrical. Similarly, when it is known that no electrical equipment is involved, the power source should be reported as "none," instead of "unknown."

These changes are made before any other steps in data preparation.

Exposure fires

Some fires involved more than one residential structure. The initial structure is identified as "exposure zero" in the data file. Structure fires that spread from the initial fire are identified as "exposure fires" and are numbered from "zero," up to as many structures as necessary. Typically, in exposure fires, most of the information on the variables listed above is not filled out for exposures beyond the initial home.

If the initial fire was a residential structure fire, CPSC staff transferred the fire cause values, such as Cause of Ignition, Equipment Involved, or Heat Source, from the initial fire to the exposure fire. Thus, if a portable heater caused the initial fire, all exposures would be considered portable heater fires. All associated deaths, injuries, and property losses in these exposures also would be attributed to portable heaters. Any residential structure exposure fire that originated from a non-residential structure fire is also considered in-scope for this report. If the initial fire is not a residential structure fire, but the exposure fire is a residential structure fire, then the cause information is not passed down from the initial fire. For example, if a wildfire is started by a cigarette, and then the fire spreads to homes, the wildfire would not count as a residential structure fire, but the exposure home fires would. The cigarette as the heat source would not be passed on to the home fires in this case. The cause information for the exposure home fires would be left as is.

Confined fires

By far, the biggest proportion of missing data was encountered among the confined fires. By NFIRS's definition, a fire that is confined to a noncombustible container causing no flame damage beyond the container is considered to be confined.

In NFIRS version 5.0, the following Incident Type codes are used to identify the different types of confined fires.

Incident Type Code	*Definition*
113	Fire involving the contents of a cooking vessel without fire extension beyond the vessel.
114	Fire originating in and confined to a chimney or flue.

115	Fire caused by overload or malfunction of an incinerator, with no flame damage outside the incinerator.
116	Fire caused by delayed ignition or malfunction of a fuel or oil burner/boiler, with no flame damage outside the box.
117	Fire originating in and confined to contents of a trash compactor. Home trash compactors are excluded.
118	Fire involving a trash or rubbish fire in a structure with no flame damage to structure or its contents.

With the proportion of reported confined fires increasing, the proportion of missing data also increases. However, imputation of unknowns based on the information from confined fires is not a viable option. From the definition of the Incident Type of confined fires, it is unclear whether they are at all similar to the rest of the fires by Equipment Involved in Ignition, the Equipment Power Source, Heat Source, or Item First Ignited. As such, CPSC staff separates all confined fires from the data before the product-specific estimates are derived. The confined fire and fire loss counts were weighted up to the NFPA estimates, using the same weights as the rest of the data and presented at the aggregate levels (and sometimes at more specific levels as allowed by the Incident Type definitions). See the section on Estimation Procedure below for a discussion of the weights used. Tables 8a through 8c present all estimates related to confined fires. These estimates are also included in Tables 1a through 5d, as appropriate. Note that they do not appear in Tables 4a through 5d at any of the specific levels because there is no information available on Equipment Power Source.

Table 8a. Estimated Residential Confined Fires: 2015–2017

Included in Table Categories:	Appear in Tables:	2015	2016	2017
Total Residential	1a, 2a, 3a, 4a, 5a	193,000	181,000	190,000
Total Heating and Cooling Equipment	1a, 3a	26,700	22,200	21,700
Fireplace, Chimney, Connector	*1a, 3a*	*18,300*	*14,500*	*14,000*
Other (Burner/Boiler)	*1a, 3a*	*8,400*	*7,700*	*7,700*
Cooking	1a, 2a	146,900	139,600	146,500
Trash, Rubbish	2a	17,900	17,900	20,300
Incinerator	-	600	500	500
Trash Compactor	-	900	800	900

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Fire estimates are rounded to nearest 100. Rounded estimates less than 100 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. No information was available on the intentionality of these fires.

There were no confined fire deaths in 2015, 2016, or 2017.

Table 8b. Estimated Residential Confined Fire Injuries: 2015–2017

Included in Table Categories:	Appear in Tables:	2015	2016	2017
Total Residential	1c, 2c, 3c, 4c, 5c	1,420	1,410	1,320
Total Heating and Cooling Equipment	1c, 3c	40	30	40
Fireplace, Chimney, Connector	*1c, 3c*	*20*	*20*	*10*
Other (Burner/Boiler)	*1c, 3c*	*30*	*10*	*30*
Cooking	1c, 2c	1,310	1,330	1,230
Trash, Rubbish	2c	60	50	40
Incinerator	-	*	*	10
Trash Compactor	-	*	*	0

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Injury estimates rounded to nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. No information was available on the intentionality of these fires.

Table 8c. Estimated Residential Confined Fire Property Loss (In Millions): 2015–2017

Included in Table Categories:	Appear in Tables:	2015	2016	2017
Total Residential	1d, 2d, 3d, 4d, 5d	$44.2	$42.1	$47.2
Total Heating and Cooling Equipment	1d, 3d	$8.5	$7.9	$8.1
Fireplace, Chimney, Connector	*1d, 3d*	*$6.3*	*$6.0*	*$4.5*
Other (Burner/Boiler)	*1d, 3d*	*$2.3*	*$1.9*	*$3.5*
Cooking	1d, 2d	$32.1	$31.0	$34.2
Trash, Rubbish	2d	$2.7	$2.6	$4.5
Incinerator	-	$0.7	$0.4	$0.3
Trash Compactor	-	$0.1	$0.1	$0.1

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Property loss estimates are rounded to the nearest tenth of a million dollars. Rounded estimates less than $0.1m are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. No information was available on the intentionality of these fires.

Other missing data

Tables 9a–9c show the proportion of data missing after inferring missing data when appropriate. Because most of the data fields for confined fires were not reported, those data fields were excluded from the tabulations.

Table 9a. Missing Data on Residential Structure Fires: 2015–2017

	2015	2016	2017
Cause of Ignition	34%	34%	36%
Heat Source	39%	40%	41%
Item First Ignited	39%	41%	41%
Equipment Involved	41%	43%	48%
Equipment Power	41%	43%	47%

Source: U.S. Consumer Product Safety Commission/EPHA, from NFIRS data obtained from the USFA. Table excludes confined fires.

Table 9b. Missing Data on Residential Structure Fire Deaths: 2015–2017

	2015	2016	2017
Cause of Ignition	60%	59%	61%
Heat Source	63%	63%	66%
Item First Ignited	64%	63%	67%
Equipment Involved	55%	51%	55%
Equipment Power	53%	51%	56%

Source: U.S. Consumer Product Safety Commission/EPHA, from NFIRS data obtained from the USFA.

Table 9c. Missing Data on Residential Structure Fire Injuries: 2015–2017

	2015	2016	2017
Cause of Ignition	39%	39%	42%
Heat Source	39%	39%	41%
Item First Ignited	37%	36%	39%
Equipment Involved	34%	35%	37%
Equipment Power	34%	34%	38%

Source: U.S. Consumer Product Safety Commission/EPHA, from NFIRS data obtained from the USFA. Table excludes injuries from confined fires.

For these data, an assumption was made that the unknown values for a characteristic had the same distribution as the known values for that characteristic. To allocate these unknowns for the various characteristics, "raking" was performed using a SAS® macro.[32] The raking procedure maintains the marginal distributions for the known data, while allocating the unknown data for all characteristics involved.[33] For each year, the raking procedure was applied separately for fires, deaths, injuries, and property loss.

For the CPSC staff estimates going back to 1980 all the way up to 2014, one raking procedure was applied separately for each of the tables 1–5 (a–d). In 2013, there was a lot of volatility in the estimates from the raking for Table 2b (the fire death estimates for products that are a Heat Source or Item First Ignited). The raking behaved erratically and produced estimates abnormally high for some products and abnormally low for others, even though these discrepancies were not apparent in the pre-raked counts. To address this, and to produce the Table 2b estimates for 2013, CPSC staff ran a raking on combined 2012 through 2014 data, where year was added as a raking variable. This smoothed out the estimates for 2013.

This erratic behavior in the initial Table 2b raking for 2013 is more likely to happen as more of the data are unknown, which is the trend with Heat Source in deadly fires. It is also more likely to happen the more *cells* there are in the raking. Cells are the different values for the known data into which the unknown data are allocated. For example, in Table 2b, the different cells are all the various possible combinations of the three raking variables: Cause of Ignition (Unintentional or Intentional), Heat Source (*e.g.*, Cigarette, Candle, Match, Lighter), and Item First Ignited (*e.g.*, Upholstered Furniture, Mattress, Bedding, Cooking Materials, Floor Covering, Clothing). The number of cells in the raking is the product of the number of levels for each of these variables. So for Table 2b, the raking was dealing with a large number of cells, a lot of missing data, and a lot of cells filled with zeros (combinations of the three raking variables where there are zero NFIRS deaths for a given year).

[32] M. Battaglia, D. Hoaglin and D. Izrael, "To Rake or Not To Rake Is Not the Question Anymore with the Enhanced Raking Macro," SAS® Users Group International (SUGI) 29th Annual Conference, May 9–12, 2004, Paper #207-29.

[33] M.A. Greene, L.E. Smith, M.S. Levenson, S. Hiser, and J.H. Mah, "Raking Fire Data," Presented at the Federal Conference on Statistical Methodology, Arlington, VA, 2001.

Anticipating more difficulties like the one that occurred for Table 2b in 2013, CPSC staff decided to make a change for 2015 and subsequent years. Instead of using just one raking per table, CPSC staff now does a raking for each product. For example, for the Table 2b estimate for candle fire deaths, the raking only includes two variables: Cause of Ignition (Intentional or Unintentional) and Heat Source ("candle" or "not candle"). From this raking, an estimate for candle fire deaths is produced. Such rakings are done for each row in each table. With so few cells in the rakings, the problem that occurred in 2013, would be prevented from happening in the future.

Quality Control Checks of NFIRS Data

In 2006, a California home fire with a $100 million property loss was reported to NFIRS. Because this loss was unusually high, CPSC staff decided to assign the fire to CPSC field staff to investigate and confirm the amount of this large property loss. The actual fire department estimate of property loss for the fire was $100,000. The property loss was corrected, and the weight used for property loss estimates was changed accordingly.

Because of the finding on the 2006 CA fire loss, CPSC staff initiated more quality-control checking of the NFIRS data, beginning with the 2007 data. In 2014, 2015, and 2016, residential structure fires with reported property losses of $5 million or higher were assigned to CPSC field staff to confirm with the fire department the high-property-loss estimate. There were 10 high-property-loss fires from 2016, which were assigned for investigation. In seven of the fires, the property loss estimate was confirmed. In the other three fires, a lower property loss estimate was obtained, and the data were corrected.

In addition to the quality-control checking of high-property-loss fire reports, some quality control was carried out on multiple-death fire incidents for the 2015, 2016, and 2017 data. In cases with three or more civilian deaths reported, a search of the Internet was conducted to look for news articles and fire marshal reports to confirm (or add to) the fire cause information given in the NFIRS report. There were 39 cases from 2017, in which it appeared that there might be information to conflict with, or add to, the information from the NFIRS report. These cases were assigned to field staff to contact the fire department and reconcile the information. From these investigations, 17 cases had fire cause information edited. In three instances, the investigation concluded that the deaths involved occurred before the fires, and thus, the data were edited so that there were no deaths attributed to these fires.

Beginning with the 2015 data, a new class of NFIRS incidents was assigned to CPSC field staff for investigation. There has been concern that some fires where the Heat Source was coded as "43 – Hot ember or ash," or where the Heat Source was coded as "60 – Heat from other open flame or smoking materials," are actually miscodings of fires where a cigarette was the correct Heat Source. For the 2015, 2016, and 2017 data, CPSC staff assigned to field investigators all incidents with at least one fire death, where the coded Heat Source was either "43 – Hot ember or ash" or "60 – Heat from other open flame or smoking materials." In these cases, the investigator was instructed to contact the attending fire department and inquire about what specifically provided the source of heat for the fire.

In 2017, there were 62 residential structure fires in NFIRS with at least one death and a Heat Source coded as either "43 – Hot ember or ash" or "60 – Heat from other open flame or smoking materials." CPSC staff assigned 59 of these incidents to field investigators to try to identify the heat source of each of these fires. According to the NFIRS codes, these 59 fires led to 65 deaths and 14 nonfatal injuries.

Of these 59 fatal fires, 21 were coded with a Heat Source of "43 – Hot ember or ash" and 38 were coded "60 – Heat from other open flame or smoking materials." Of the 21 deadly fires that were coded as "Hot ember or ash," an investigation was completed in 19 of them. From those 19 investigations, CPSC staff

edited the Heat Source in 17 of them, including 13 where CPSC staff changed the Heat Source to "61 – Cigarette." Of the 38 deadly fires where the Heat Source was coded as "60 – Heat from other open flame or smoking materials," CPSC field staff were able to complete investigations for 32 of them. From these 32 completed investigations, information was provided, such that CPSC staff changed the Heat Source in 19 of them, including four where the Heat Source was changed to "61 – Cigarette."

The Heat Source codes of "43 – Hot ember or ash" and "60 – Heat from other open flame or smoking materials" are two of the heat sources that comprise the "Other" category for the estimates for "Upholstered Furniture" and "Mattress, Bedding" in Tables 2a, 2b, 2c, and 2d. This editing that was done in 2015, 2016, and 2017, will have the effect of increasing the deaths estimates (Table 2b) for the "Smoking Material Ignition" subset of "Upholstered Furniture" and "Mattress, Bedding" and decreasing the "Other" estimates. The editing will also have the effect of increasing the estimates for "Cigarette, Other Tobacco Products." A shift of one NFIRS fire death from one category to another will shift the estimates by more than one, due to the deaths being weighted and because the editing is done before the unknowns are allocated. To a lesser degree than the deaths (Table 2b), this shift will occur for the injury estimates (Table 2c) because there were also some nonfatal injuries that occurred in these fires.

Summary of Changes

For all three years of estimates in this report (2015–2017), there are three differences from the methodology for producing estimates for previous years. The first is that CPSC staff did not make adjustments for the Equipment Involved in Ignition rule change as it did in 2012, 2013, and 2014. This lack of adjustment will lead to much higher estimates for many equipment products, particularly electrical distribution equipment. As coders learn that they no longer have to code the Equipment Involved in Ignition in all cases, this may lead to a gradual decline in estimates, particularly for fires.

The second difference is that raking was done for each row in each table, as opposed to just one per table. This will have a small effect on estimates, but not a consistently upward or downward effect. This change should prevent the raking from behaving erratically[34], even if the proportion of data that is unknown (particularly for deadly fire Heat Sources) continues to rise as it has been doing.

The third change is that deadly fires coded with a Heat Source of "43 – Hot ember or ash" or "60 – Heat from other open flame or smoking materials," are assigned to CPSC field staff for possible editing. This change causes a shift in the estimates for fire deaths from "Other Heat Source" in Table 2b (under Upholstered Furniture and Mattress, Bedding), to "Smoking Material Ignition," and an increase in the estimates for "Cigarette, Other Tobacco Products." CPSC staff understands this editing is a departure from previous years' methodology, but staff is determined to improve the accuracy of its estimates, where it is practicable.

Comparisons of 2015, 2016, and 2017 estimates and estimates for previous years should be made with caution, because these changes have an effect on the estimates. Also, comparisons of estimates for Equipment Involved in Ignition products within the years of 2015 through 2017, should be done with caution, because estimates may be declining due to NFIRS coders reverting to pre-2012 coding behavior.

[34] When raking was done for a whole table at one time (before 2015 data), it ran the risk of producing unusual estimates, where products with similar counts before raking, had much different estimates after raking. When this happened in 2013, multiple years were combined in the raking to arrive at more logical estimates. To avoid this, CPSC staff now runs the raking algorithm for each estimate one at a time. This should make the risk of the raking leading to unusual estimates quite low.