2014–2016 Residential Fire Loss Estimates*

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

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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 2014 through 2016.

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

- 361,500 fires, 2,420 deaths, 11,120 injuries, and $6.35 billion in property losses in 2014;
- 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; and
- an estimated annual average of 361,400 fires, 2,350 deaths, and 10,760 injuries and $6.45 billion in property losses over the 3-year period from 2014 through 2016.

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 produces 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 can count as 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.

The same products continue to contribute to the greatest estimated numbers of fires 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 167,100 cooking equipment-related fires from 2014 through 2016 accounted for 46.2 percent of the average annual estimate of total residential fires for the same period. The corresponding death estimates constitute an annual average of 240 deaths, which is 10.3 percent of the average annual estimate of total residential fire deaths. The annual average number of cooking fire injuries for 2014 through 2016 was estimated to be 3,370, which represents 31.3 percent of the total estimated annual average number of injuries for the same time 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 44,200 fires for 2014–2016 was 12.2 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 9.7 percent of the average annual estimated number of total residential fire deaths. The corresponding injuries for the three years averaged to an annual estimate of 850. This accounts for 7.9 percent of the annual average estimate of total injuries during 2014–2016.

- An estimated annual average of 17,000 fires was attributable to electrical distribution equipment (*e.g.*, installed wiring, lighting). This is 4.7 percent of the estimated annual average number of residential fires for this period. The annual average death estimate is 200 (8.4 percent of average annual estimated residential fire deaths); and the injury estimates averaged 570, which is 5.3 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 2014 through 2016, an estimated annual average of 470 deaths was associated with these fires. This constitutes 20.0 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 2014 to 2016, mattress or bedding ignitions accounted for an annual average of 330 deaths, which is 14.0 percent of the average annual estimated number of total residential fire deaths (from an estimated 1.9 percent of the fires).

- For Heat Source, smoking materials were the largest contributor to deaths, associated with an annual average of 550 deaths from 2014 to 2016. This is 23.6 percent of the estimated annual average of total residential fire deaths. Smoking materials, however, comprised only 2.9 percent of the total estimated residential fires.

- Among products that are Heat Sources, candles were tied with cigarette lighters for the second highest estimated number of deaths. The estimated annual average of deaths from candle fires is 70, which is 2.8 percent of the average estimated total number of residential fire deaths from 2014 to 2016. Candles account for an estimated 1.6 percent of the fires.

- There were also an estimated 70 deaths from cigarette lighter fires (2.8 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 only 0.1 percent of residential fires.

- There was a significant decline in the estimates of total fires between 2015 and 2016. The estimate of residential structure fires dropped from 370,900 in 2015 to 351,900 in 2016, a decline of 5.1%.

The USFA began new coding rules for NFIRS beginning with 2012 and had them in place through 2014. These rules led to an increase in the amount of fires coded with specific Equipment Involved in Igntion codes. For these years, CPSC staff made adjustments to keep estimates for these Equipment Involved in Ignition products in line with previous years. USFA reverted to the old coding rules beginning in 2015, so CPSC staff did not make these adjustments to estimates for 2015 and 2016 data. This is explained in greater detail on pages 29 and 30 of this report.

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. The 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 arrive at 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, while 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 2014, 2015, and 2016 NFPA estimates for total U.S. fire losses to arrive at 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 2016, 49 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.

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 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, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[3]	**361,500**	**370,900**	**351,900**	**361,400**
Total Heating and Cooling Equipment[3]	**44,300**	**47,000**	**41,300**	**44,200**
Local Fixed Heater	4,400	5,700	5,300	5,100
Portable Heater	1,600	2,000	1,700	1,800
Central Heating	800	1,000	1,000	900
Fireplace, Chimney, Chimney Connector[3]	22,500	20,300	16,500	19,800
Water Heater	1,500	2,100	2,000	1,900
Air Conditioning	1,100	1,700	1,700	1,500
Other[3]	13,300	15,500	14,400	14,400
Total Cooking Equipment[3]	**159,900**	**176,100**	**165,400**	**167,100**
Range/Oven	13,100	19,900	17,400	16,800
Gas	*1,800*	*2,700*	*2,200*	*2,200*
Electric	*11,300*	*17,200*	*15,100*	*14,500*
Other	*	*100*	*100*	*
Microwave Oven	500	1,000	900	800
All Other Cooking	3,300	6,000	5,400	4,900
Gas	*800*	*1,400*	*1,400*	*1,200*
Electric	*2,300*	*4,100*	*3,500*	*3,300*
Other	*200*	*500*	*500*	*400*
Total Electrical Distribution	**9,400**	**21,700**	**20,000**	**17,000**
Installed Wiring	4,700	10,200	9,400	8,100
Cord, Plug	900	2,000	1,900	1,600
Receptacle, Switch	1,200	3,000	2,600	2,300
Lighting	1,200	2,900	2,600	2,300
Other	1,400	3,600	3,500	2,800
Other Selected Equipment	**7,600**	**12,000**	**11,200**	**10,300**
Audio/Visual Equipment	300	400	400	400
Clothes Dryer	4,900	7,900	7,300	6,700
Dishwasher	400	500	500	500
Washing Machine	200	500	400	400
Torch	500	700	600	600
Refrigerator/Freezer	600	900	900	800
Shop/Garden Tool	700	1,100	1,000	900

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, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[4]	**2,420**	**2,230**	**2,410**	**2,350**
Total Heating and Cooling Equipment	**230**	**210**	**250**	**230**
Local Fixed Heater	70	70	70	70
Portable Heater	90	80	100	90
Central Heating	10	*	*	*
Fireplace, Chimney, Chimney Connector	20	20	40	30
Water Heater	*	*	10	10
Air Conditioning	10	20	20	20
Other	30	50	50	40
Total Cooking Equipment	**210**	**280**	**240**	**240**
Range/Oven	190	180	160	180
Gas	*20*	*40*	*20*	*30*
Electric	*170*	*140*	*140*	*150*
Other	*	*	*	*
Microwave Oven	10	*	*	*
All Other Cooking	20	70	50	40
Gas	*10*	*10*	*	*10*
Electric	*10*	*60*	*40*	*40*
Other	*	*	*	*
Total Electrical Distribution	**150**	**220**	**220**	**200**
Installed Wiring	70	70	60	70
Cord, Plug	40	60	110	70
Receptacle, Switch	20	30	20	20
Lighting	10	20	10	10
Other	10	40	20	20
Other Selected Equipment	**10**	**20**	**20**	**20**
Audio/Visual Equipment	*	*	*	*
Clothes Dryer	*	10	*	*
Dishwasher	*	*	*	*
Washing Machine	*	*	*	*
Torch	*	*	*	*
Refrigerator/Freezer	10	*	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 2014, 2015, or 2016.

TABLE 1c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED EQUIPMENT, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[5]	**11,120**	**10,800**	**10,370**	**10,760**
Total Heating and Cooling Equipment[5]	**830**	**870**	**830**	**850**
Local Fixed Heater	330	430	390	380
Portable Heater	140	150	150	150
Central Heating	30	20	40	30
Fireplace, Chimney, Chimney Connector[6]	70	50	40	50
Water Heater	60	60	50	60
Air Conditioning	50	60	50	50
Other[5]	210	190	170	190
Total Cooking Equipment[5]	**3,080**	**3,650**	**3,370**	**3,370**
Range/Oven	1,410	1,780	1,550	1,580
Gas	*160*	*200*	*120*	*160*
Electric	*1,250*	*1,580*	*1,430*	*1,420*
Other	*	*	*	*
Microwave Oven	30	70	50	50
All Other Cooking	280	390	310	330
Gas	*60*	*80*	*70*	*70*
Electric	*200*	*280*	*210*	*230*
Other	*20*	*30*	*30*	*30*
Total Electrical Distribution	**430**	**620**	**670**	**570**
Installed Wiring	180	210	220	210
Cord, Plug	90	130	110	110
Receptacle, Switch	40	70	90	70
Lighting	60	110	100	90
Other	60	100	150	100
Other Selected Equipment	**260**	**310**	**380**	**320**
Audio/Visual Equipment	20	30	20	20
Clothes Dryer	160	160	210	180
Dishwasher	10	*	20	10
Washing Machine	*	10	10	10
Torch	20	30	20	20
Refrigerator/Freezer	20	40	80	40
Shop/Garden Tool	40	40	30	30

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. 32 for details.

TABLE 1d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In $Millions[6]) SELECTED EQUIPMENT, 2014–2016

Equipment	2014	2015	2016	2014 – 2016 Average
Total Residential[7]	**$6,352.1**	**$6,631.0**	**$6,364.9**	**$6,449.3**
Total Heating and Cooling Equipment[7]	**$541.5**	**$622.9**	**$619.8**	**$594.7**
Local Fixed Heater	$117.8	$149.5	$132.5	$133.3
Portable Heater	$69.5	$101.7	$64.1	$78.4
Central Heating	$23.0	$33.8	$38.3	$31.7
Fireplace, Chimney, Chimney Connector[7]	$146.4	$115.9	$120.9	$127.7
Water Heater	$31.3	$51.2	$37.4	$40.0
Air Conditioning	$26.0	$34.3	$61.5	$40.6
Other[7]	$140.9	$183.2	$200.0	$174.7
Total Cooking Equipment[7]	**$408.5**	**$707.9**	**$628.3**	**$581.6**
Range/Oven	$270.5	$369.5	$346.2	$328.7
Gas	*$40.3*	*$47.2*	*$40.0*	*$42.5*
Electric	*$229.7*	*$321.3*	*$305.3*	*$285.4*
Other	*$0.5*	*$1.1*	*$0.9*	*$0.8*
Microwave Oven	$9.8	$23.8	$20.2	$18.0
All Other Cooking	$99.5	$214.0	$170.9	$161.5
Gas	*$25.7*	*$86.3*	*$53.8*	*$55.3*
Electric	*$65.7*	*$94.5*	*$84.2*	*$81.5*
Other	*$8.1*	*$33.1*	*$32.9*	*$24.7*
Total Electrical Distribution	**$326.1**	**$639.2**	**$636.0**	**$533.8**
Installed Wiring	$169.0	$311.7	$306.9	$262.5
Cord, Plug	$34.3	$65.3	$67.8	$55.8
Receptacle, Switch	$30.8	$68.0	$53.7	$50.8
Lighting	$38.9	$79.1	$82.0	$66.7
Other	$53.0	$115.2	$125.6	$97.9
Other Selected Equipment	**$170.9**	**$209.6**	**$203.8**	**$194.7**
Audio/Visual Equipment	$5.3	$9.7	$7.7	$7.6
Clothes Dryer	$59.7	$92.1	$95.0	$82.3
Dishwasher	$12.3	$15.1	$95.0	$12.3
Washing Machine	$2.4	$4.4	$7.2	$4.7
Torch	$37.3	$22.3	$22.6	$27.4
Refrigerator/Freezer	$25.3	$29.3	$30.7	$28.4
Shop/Garden Tool	$29.0	$36.6	$31.2	$32.3

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. 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. 34 for details.

TABLE 2a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
SELECTED PRODUCTS, 2014–2016

Product	2014	2015	2016	2014–2016 Average
Total Residential[8]	**361,500**	**370,900**	**351,900**	**361,400**
By Heat Source				
Cigarette, Other Tobacco Products	**10,000**	**10,800**	**10,800**	**10,600**
Match	**400**	**400**	**300**	**400**
Lighter	**1,500**	**1,600**	**1,600**	**1,600**
Candle	**5,700**	**5,800**	**5,300**	**5,600**
By Item First Ignited				
Upholstered Furniture	**4,400**	**4,600**	**4,200**	**4,400**
Smoking Material Ignition	1,100	1,200	1,100	1,100
Open-Flame Ignition	500	500	500	500
Other[9]	2,900	2,800	2,700	2,800
Mattress, Bedding	**7,500**	**6,900**	**6,500**	**7,000**
Smoking Material Ignition	1,500	1,300	1,400	1,400
Open-Flame Ignition	1,300	1,200	1,100	1,200
Other[9]	4,800	4,400	4,100	4,400
Other Materials				
Cooking Materials[8]	164,400	168,600	159,700	164,200
Electric Cable Insulation	17,300	16,700	16,700	16,900
Interior Wall Covering	6,500	6,300	5,800	6,200
Wearing Apparel-Worn	300	300	300	300
Wearing Apparel-Not Worn	4,900	4,800	4,500	4,700
Floor Covering	3,400	3,400	3,300	3,400
Curtains, Drapes	1,300	1,300	1,100	1,200
Magazines, Newspaper	1,600	1,500	1,300	1,500
Thermal Insulation	5,700	5,700	5,300	5,600
Cabinet, Desk	4,700	4,700	4,300	4,500
Trash, Rubbish[7]	21,600	22,300	22,300	22,100
Toy, Game	200	200	200	200
Box, Carton, Bag, Basket, Barrel	2,600	2,700	2,700	2,700

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, 2014–2016

Product	2014	2015	2016	2014–2016 Average
Total Residential[10]	**2,420**	**2,230**	**2,410**	**2,350**
By Heat Source				
Cigarette, Other Tobacco Products	**460**	**530**	**670**	**550**
Match	**30**	*****	*****	**10**
Lighter	**70**	**40**	**80**	**70**
Candle	**80**	**60**	**70**	**70**
By Item First Ignited				
Upholstered Furniture	**540**	**510**	**370**	**470**
Smoking Material Ignition	180	300	220	230
Open-Flame Ignition	40	30	40	40
Other	310	180	120	200
Mattress, Bedding	**360**	**270**	**360**	**330**
Smoking Material Ignition	190	180	250	200
Open-Flame Ignition	20	10	20	20
Other	150	80	90	110
Other Materials				
Cooking Materials	170	200	210	190
Electric Cable Insulation	160	110	90	120
Interior Wall Covering	60	80	90	80
Wearing Apparel-Worn	60	90	90	80
Wearing Apparel-Not Worn	40	30	80	50
Floor Covering	80	60	130	90
Curtains, Drapes	20	10	10	10
Magazines, Newspaper	40	20	40	30
Thermal Insulation	10	*	*	10
Cabinet, Desk	40	20	20	30
Trash, Rubbish	20	20	60	30
Toy, Game	*	*	*	*
Box, Carton, Bag, Basket, Barrel	*	*	30	10

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 2014, 2015, or 2016.

TABLE 2c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED PRODUCTS, 2014–2016

Product	2014	2015	2016	2014–2016 Average
Total Residential[11]	**11,120**	**10,800**	**10,370**	**10,760**
By Heat Source				
Cigarette, Other Tobacco Products	**1,020**	**850**	**920**	**930**
Match	**60**	**40**	**30**	**40**
Lighter	**240**	**230**	**220**	**230**
Candle	**690**	**540**	**600**	**610**
By Item First Ignited				
Upholstered Furniture	**710**	**710**	**570**	**660**
Smoking Material Ignition	200	250	260	240
Open-Flame Ignition	80	90	50	70
Other	430	370	270	350
Mattress, Bedding	**1,160**	**910**	**860**	**980**
Smoking Material Ignition	370	280	310	320
Open-Flame Ignition	360	160	180	230
Other	440	470	370	430
Other Materials				
Cooking Materials[11]	3,830	3,600	3,440	3,620
Electric Cable Insulation	560	440	330	440
Interior Wall Covering	200	260	260	240
Wearing Apparel-Worn	90	100	160	120
Wearing Apparel-Not Worn	330	190	290	270
Floor Covering	210	140	140	160
Curtains, Drapes	110	100	90	100
Magazines, Newspaper	170	110	70	110
Thermal Insulation	60	70	40	50
Cabinet, Desk	350	290	220	290
Trash, Rubbish[12]	220	240	270	240
Toy, Game	*	10	30	10
Box, Carton, Bag, Basket, Barrel	160	140	140	150

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. 32 for details.

TABLE 2d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In $Millions[12]) SELECTED PRODUCTS, 2014–2016

Product	2014	2015	2016	2014–2016 Average
Total Residential[13]	**$6,352.1**	**$6,631.0**	**$6364.9**	**$6,449.3**
By Heat Source				
Cigarette, Other Tobacco Products	**$334.6**	**$392.9**	**$410.5**	**$379.4**
Match	**$17.5**	**$17.0**	**$15.5**	**$16.7**
Lighter	**$58.0**	**$57.3**	**$57.1**	**$57.5**
Candle	**$223.2**	**$241.5**	**$170.1**	**$211.6**
By Item First Ignited				
Upholstered Furniture	**$242.3**	**$263.9**	**$204.7**	**$236.9**
Smoking Material Ignition	$62.4	$69.9	$52.6	$61.6
Open-Flame Ignition	$30.9	$27.7	$26.2	$28.3
Other	$149.0	$166.2	$125.9	$147.0
Mattress, Bedding	**$276.1**	**$221.8**	**$235.5**	**$244.5**
Smoking Material Ignition	$47.6	$37.7	$54.3	$46.5
Open-Flame Ignition	$66.9	$42.2	$41.8	$50.3
Other	$161.7	$141.9	$139.3	$147.7
Other Materials				
Cooking Materials[13]	$549.6	$485.4	$478.2	$504.4
Electric Cable Insulation	$437.6	$438.0	$463.9	$446.5
Interior Wall Covering	$301.7	$283.5	$259.7	$281.6
Wearing Apparel-Worn	$4.4	$2.3	$14.5	$7.1
Wearing Apparel-Not Worn	$119.3	$110.0	$107.3	$112.2
Floor Covering	$105.6	$106.2	$122.5	$111.4
Curtains, Drapes	$62.6	$53.7	$40.7	$52.3
Magazines, Newspaper	$44.4	$45.5	$43.4	$44.4
Thermal Insulation	$193.2	$167.5	$179.4	$180.0
Cabinet, Desk	$174.5	$173.8	$155.6	$168.0
Trash, Rubbish[14]	$137.3	$162.6	$156.3	$152.1
Toy, Game	$4.5	$2.9	$8.2	$5.2
Box, Carton, Bag, Basket, Barrel	$104.5	$98.2	$84.6	$95.8

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, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[14]	**361,500**	**370,900**	**351,900**	**361,400**
Total Heating and Cooling Equipment[14]	**44,300**	**47,000**	**41,300**	**44,200**
Solid Fuel	**2,000**	**2,200**	**2,200**	**2,100**
Fixed Heater	400	500	500	500
Portable Heater	*	*	*	*
Fireplace, Chimney, Chimney Connector	1,400	1,600	1,600	1,600
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	*	100	*
Gas-Fired	**2,300**	**3,000**	**2,600**	**2,700**
Fixed Heater	800	1,000	800	900
Portable Heater	100	200	200	200
Fireplace, Chimney, Chimney Connector	200	200	200	200
Central Heating	300	400	400	300
Water Heater	700	1,000	800	800
Fixed, Central Air Conditioning	*	*	*	*
Other	200	300	200	200
Electric	**10,100**	**14,600**	**13,900**	**12,900**
Fixed Heater	3,100	3,600	3,500	3,400
Portable Heater	1,300	1,500	1,300	1,400
Central Heating	400	500	400	400
Water Heater	800	900	900	900
Fixed, Central Air Conditioning	800	1,200	1,200	1,100
Portable Air Conditioner	300	500	500	400
Other	4,300	6,400	6,000	5,600
Liquid Fuel	**300**	**400**	**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. 33 for details.

TABLE 3b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
HEATING AND COOLING EQUIPMENT, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[15]	**2,420**	**2,230**	**2,410**	**2,350**
Total Heating and Cooling Equipment	**230**	**210**	**250**	**230**
Solid Fuel	**40**	**50**	**60**	**50**
Fixed Heater	10	40	10	20
Portable Heater	*	*	10	*
Fireplace, Chimney, Chimney Connector	20	10	20	20
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	*	*	*
Gas-Fired	**40**	**20**	**30**	**30**
Fixed Heater	20	10	20	10
Portable Heater	20	*	*	10
Fireplace, Chimney, Chimney Connector	*	*	10	*
Central Heating	*	*	*	*
Water Heater	*	*	10	*
Fixed, Central Air Conditioning	*	*	*	*
Other	*	*	*	*
Electric	**150**	**110**	**140**	**130**
Fixed Heater	40	10	10	20
Portable Heater	60	50	90	70
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Fixed, Central Air Conditioning	*	10	10	10
Portable Air Conditioner	10	10	*	10
Other	30	40	20	30
Liquid Fuel	**10**	**20**	**20**	**20**
Fixed Heater	*	*	10	*
Portable Heater	10	20	*	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 2014, 2015, or 2016.

TABLE 3c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
HEATING AND COOLING EQUIPMENT, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[16]	**11,120**	**10,800**	**10,370**	**10,760**
Total Heating and Cooling Equipment[16]	**830**	**870**	**830**	**850**
Solid Fuel	**50**	**50**	**40**	**50**
Fixed Heater	20	20	30	20
Portable Heater	*	*	*	*
Fireplace, Chimney, Chimney Connector	30	20	20	20
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	10	*	*
Gas-Fired	**170**	**200**	**120**	**160**
Fixed Heater	50	110	60	70
Portable Heater	30	10	*	10
Fireplace, Chimney, Chimney Connector	10	10	10	10
Central Heating	10	20	20	20
Water Heater	50	50	30	40
Fixed, Central Air Conditioning	*	*	*	*
Other	30	*	10	10
Electric	**510**	**550**	**600**	**550**
Fixed Heater	240	250	260	250
Portable Heater	100	90	110	100
Central Heating	10	*	10	10
Water Heater	10	10	10	10
Fixed, Central Air Conditioning	40	30	40	40
Portable Air Conditioner	10	30	10	20
Other	130	130	150	140
Liquid Fuel	**30**	**30**	**50**	**40**
Fixed Heater	*	*	10	*
Portable Heater	20	30	30	30
Fireplace, Chimney, Chimney Connector	*	*	*	*
Central Heating	*	*	10	*
Water Heater	*	*	*	*
Other	*	*	*	*
All Other Fuel	**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.

[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. 32 for details.

TABLE 3d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In $Millions[17]) HEATING AND COOLING EQUIPMENT, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[18]	**$6,352.1**	**$6,631.0**	**$6,364.9**	**$6,449.3**
Total Heating and Cooling Equipment[18]	**$541.5**	**$622.9**	**$619.8**	**$594.7**
Solid Fuel	**$107.7**	**$129.9**	**$110.1**	**$115.9**
Fixed Heater	$22.6	$31.2	$23.8	$25.9
Portable Heater	*	$0.5	$0.3	$0.3
Fireplace, Chimney, Chimney Connector	$82.2	$95.9	$81.3	$86.5
Central Heating	$1.0	$1.0	$1.2	$1.1
Water Heater	*	*	*	*
Other	$1.9	$1.3	$3.5	$2.2
Gas-Fired	**$112.9**	**$111.0**	**$93.5**	**$105.8**
Fixed Heater	$17.4	$22.1	$22.3	$20.6
Portable Heater	$4.8	$30.1	$5.3	$13.4
Fireplace, Chimney, Chimney Connector	$55.8	$8.0	$15.7	$26.5
Central Heating	$8.5	$12.4	$21.2	$14.0
Water Heater	$16.6	$31.9	$21.1	$23.2
Fixed, Central Air Conditioning	$0.1	$0.2	*	$0.1
Other	$9.7	$6.2	$7.8	$0.1
Electric	**$293.3**	**$359.6**	**$392.4**	**$348.4**
Fixed Heater	$75.3	$72.8	$63.7	$70.6
Portable Heater	$57.7	$51.0	$50.4	$53.0
Central Heating	$10.4	$14.6	$9.5	$11.5
Water Heater	$14.2	$13.6	$11.9	$13.2
Fixed, Central Air Conditioning	$13.4	$22.7	$29.7	$22.0
Portable Air Conditioner	$12.4	$36.2	$61.5	$36.7
Other	$123.2	$148.8	$165.7	$145.9
Liquid Fuel	**$16.5**	**$12.4**	**$8.4**	**$12.4**
Fixed Heater	$2.3	$2.0	$0.8	$1.7
Portable Heater	$7.0	$7.6	$5.1	$6.6
Fireplace, Chimney, Chimney Connector	$0.3	$0.5	$0.5	$0.4
Central Heating	$3.1	$1.1	$1.7	$1.9
Water Heater	$0.4	*	*	$0.1
Other	$3.4	$1.2	$0.3	$1.6
All Other Fuel	**$2.1**	**$1.4**	**$7.4**	**$3.6**

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, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[19]	**361,500**	**370,900**	**351,900**	**361,400**
Total Electrical	**43,600**	**73,900**	**67,800**	**61,800**
Electric Heating and Cooling	**10,100**	**14,600**	**13,900**	**12,900**
Central Heating	400	500	400	400
Local Fixed Heater	3,100	3,600	3,500	3,400
Portable Heater	1,300	1,500	1,300	1,400
Water Heater	800	900	900	900
Fixed, Central Air Conditioning	800	1,200	1,200	1,100
Portable Air Conditioner	300	500	500	400
Other	4,300	6,400	6,000	5,600
Electric Cooking Equipment	**13,600**	**22,300**	**19,400**	**18,400**
Range/Oven	11,300	17,200	15,100	14,500
Range/Oven Hood	100	200	200	200
Deep Fat Fryer	100	100	100	100
Grill	*	*	*	*
Microwave Oven	500	1,000	900	800
Small Heat-Producing Appliance	500	1,100	900	800
Other	2,000	2,600	2,200	2,300
Electrical Distribution	**9,400**	**22,300**	**24,000**	**18,600**
Installed Wiring	4,700	10,100	9,400	8,100
Light Fixture	900	2,000	1,800	1,600
Receptacle, Switch	1,200	3,000	2,600	2,300
Cord, Plug	900	2,000	1,900	1,600
Lamp, Light Bulb	400	900	800	700
Panel Board	400	800	800	700
Meter	300	600	600	500
Transformer	*	100	100	100
Other	700	2,700	2,500	1,900
Other Selected Electrical Appliances	**5,600**	**8,500**	**8,100**	**7,400**
Clothes Dryer	3,800	5,800	5,400	5,000
Dishwasher	400	500	500	500
Audio/Visual Equipment	300	400	400	400
Washing Machine	200	500	400	400
Refrigerator/Freezer	600	900	900	800
Shop/Garden Tools	300	300	400	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, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[20]	**2,420**	**2,230**	**2,410**	**2,350**
Total Electrical	**540**	**670**	**700**	**640**
Electric Heating and Cooling	**150**	**110**	**140**	**130**
Central Heating	*	*	*	*
Local Fixed Heater	40	10	10	20
Portable Heater	60	50	90	70
Water Heater	*	*	*	*
Fixed, Central Air Conditioning	*	10	10	10
Portable Air Conditioner	10	10	*	10
Other	30	40	20	30
Electric Cooking Equipment	**170**	**210**	**180**	**190**
Range/Oven	170	140	140	150
Range/Oven Hood	*	*	*	*
Deep Fat Fryer	*	*	*	*
Grill	*	*	*	*
Microwave Oven	10	*	*	*
Small Heat-Producing Appliance	*	30	10	20
Other	*	30	30	20
Electrical Distribution	**150**	**220**	**240**	**200**
Installed Wiring	70	70	60	70
Light Fixture	10	10	10	10
Receptacle, Switch	20	30	20	20
Cord, Plug	40	60	110	70
Lamp, Light Bulb	*	*	*	*
Panel Board	*	*	10	*
Meter	*	*	*	*
Transformer	*	*	*	*
Other	10	40	20	20
Other Selected Electrical Appliances	**10**	**10**	**20**	**10**
Clothes Dryer	*	10	*	*
Dishwasher	*	*	*	*
Audio/Visual Equipment	*	*	*	*
Washing Machine	*	*	*	*
Refrigerator/Freezer	10	*	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 2014, 2015, or 2016.

TABLE 4c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED ELECTRICAL EQUIPMENT, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[21]	**11,120**	**10,800**	**10,370**	**10,760**
Total Electrical	**2,840**	**3,740**	**3,570**	**3,380**
Electric Heating and Cooling	**510**	**550**	**600**	**550**
Central Heating	10	*	10	10
Local Fixed Heater	240	250	260	250
Portable Heater	100	90	110	100
Water Heater	10	10	10	10
Fixed, Central Air Conditioning	40	30	40	40
Portable Air Conditioner	10	30	10	20
Other	130	130	150	140
Electric Cooking Equipment	**1,450**	**1,940**	**1,690**	**1,690**
Range/Oven	1,250	1,580	1,430	1,420
Range/Oven Hood	10	10	20	10
Deep Fat Fryer	*	10	*	*
Grill	*	*	*	*
Microwave Oven	30	70	50	50
Small Heat-Producing Appliance	50	100	60	70
Other	190	170	130	160
Electrical Distribution	**430**	**630**	**830**	**630**
Installed Wiring	180	210	220	210
Light Fixture	40	70	50	50
Receptacle, Switch	40	70	90	70
Cord, Plug	90	130	110	110
Lamp, Light Bulb	20	40	50	40
Panel Board	10	10	30	20
Meter	10	*	10	*
Transformer	*	*	10	*
Other	50	100	100	80
Other Selected Electrical Appliances	**180**	**190**	**260**	**210**
Clothes Dryer	120	90	130	120
Dishwasher	10	*	20	10
Audio/Visual Equipment	20	30	20	20
Washing Machine	*	10	10	10
Refrigerator/Freezer	20	40	80	40
Shop/Garden Tool	10	10	*	10
Torch	*	*	*	*

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. 32 for details.

TABLE 4d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In $Millions[22]) SELECTED ELECTRICAL EQUIPMENT, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[23]	**$6,352.1**	**$6,631.0**	**$6,364.9**	**$6,449.3**
Total Electrical	**$1,176.3**	**$1,839.2**	**$1,790.7**	**$1,602.1**
Electric Heating and Cooling	**$293.3**	**$359.6**	**$392.4**	**$348.4**
Central Heating	$10.4	$14.6	$9.5	$11.5
Local Fixed Heater	$75.3	$72.8	$63.7	$70.6
Portable Heater	$57.7	$51.0	$50.4	$53.0
Water Heater	$14.2	$13.6	$11.9	$13.2
Fixed, Central Air Conditioning	$13.4	$22.7	$29.7	$22.0
Portable Air Conditioner	$12.4	$36.2	$61.5	$36.7
Other	$123.2	$148.8	$165.7	$145.9
Electric Cooking Equipment	**$295.3**	**$443.9**	**$409.3**	**$382.9**
Range/Oven	$229.7	$321.3	$305.3	$285.4
Range/Oven Hood	$2.0	$3.8	$1.9	$2.6
Deep Fat Fryer	$3.2	$3.0	$5.4	$3.9
Grill	$1.5	$1.1	$1.2	$1.3
Microwave Oven	$9.8	$23.8	$20.3	$18.0
Small Heat-Producing Appliance	$13.1	$27.7	$20.9	$20.5
Other	$58.9	$63.3	$54.4	$58.9
Electrical Distribution	**$326.1**	**$644.5**	**$643.6**	**$538.1**
Installed Wiring	$169.0	$310.6	$306.9	$262.2
Light Fixture	$25.2	$55.9	$54.5	$45.2
Receptacle, Switch	$30.8	$67.8	$53.7	$50.8
Cord, Plug	$34.3	$65.3	$67.8	$55.8
Lamp, Light Bulb	$13.7	$21.6	$27.3	$20.9
Panel Board	$13.1	$20.6	$23.9	$19.2
Meter	$6.7	$11.2	$14.9	$10.9
Transformer	$1.4	$3.0	$1.5	$2.0
Other	$31.8	$88.7	$93.0	$71.2
Other Selected Electrical Appliances	**$107.5**	**$144.5**	**$134.3**	**$128.8**
Clothes Dryer	$49.1	$71.6	$70.7	$63.8
Dishwasher	$12.3	$15.1	$9.3	$12.3
Audio/Visual Equipment	$5.1	$9.7	$7.7	$7.5
Washing Machine	$2.4	$4.2	$7.0	$4.5
Refrigerator/Freezer	$25.0	$29.1	$30.7	$28.3
Shop/Garden Tool	$11.6	$10.9	$6.2	$9.6
Torch	$2.0	$3.8	$2.6	$2.8

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, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[24]	**361,500**	**370,900**	**351,900**	**361,400**
Total Gas-Fired Equipment	**7,000**	**11,100**	**10,000**	**9,400**
Gas Heating Equipment	**2,300**	**3,000**	**2,600**	**2,700**
Fixed Heater	800	1,000	800	900
Portable Heater	100	200	200	200
Central Heating	300	400	400	300
Fireplace, Chimney, Connector	200	200	200	200
Water Heater	700	1,000	800	800
Fixed, Central Air Conditioning	*	*	*	*
Other	200	300	200	200
Gas Cooking Equipment	**2,600**	**3,900**	**3,500**	**3,300**
Range/Oven	1,800	2,700	2,200	2,200
Open Gas Grill	400	700	800	600
Other	400	600	500	500
Other Selected Gas Equipment	**1,800**	**2,500**	**2,300**	**2,200**
Clothes Dryer	1,100	1,600	1,500	1,400
Torch	400	500	400	400
Shop/Garden Tool	300	500	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, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[25]	**2,420**	**2,230**	**2,410**	**2,350**
Total Gas-Fired Equipment	**80**	**80**	**70**	**80**
Gas Heating Equipment	**40**	**20**	**30**	**30**
Fixed Heater	20	10	20	10
Portable Heater	20	*	*	10
Central Heating	*	*	*	*
Fireplace, Chimney, Connector	*	*	10	*
Water Heater	*	*	10	*
Fixed, Central Air Conditioning	*	*	*	*
Other	*	*	*	*
Gas Cooking Equipment	**30**	**40**	**20**	**30**
Range/Oven	20	*	20	30
Open Gas Grill	*	*	*	*
Other	10	*	*	*
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 2014, 2015, or 2016.

TABLE 5c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED GAS-FIRED EQUIPMENT, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[26]	**11,120**	**10,800**	**10,370**	**10,760**
Total Gas-Fired Equipment	**480**	**670**	**500**	**550**
Gas Heating Equipment	**170**	**200**	**120**	**160**
Fixed Heater	50	110	60	70
Portable Heater	30	10	*	10
Central Heating	10	20	20	20
Fireplace, Chimney, Connector	10	10	10	10
Water Heater	50	50	30	40
Fixed, Central Air Conditioning	*	*	10	10
Other	30	*	10	10
Gas Cooking Equipment	**210**	**260**	**180**	**220**
Range/Oven	160	200	120	160
Open Gas Grill	20	50	40	40
Other	40	20	20	30
Other Selected Gas Equipment	**70**	**100**	**80**	**80**
Clothes Dryer	30	50	50	50
Torch	20	30	10	20
Shop/Garden Tool	20	20	20	20

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. 32 for details.

TABLE 5d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In $Millions[27]) SELECTED GAS-FIRED EQUIPMENT, 2014–2016

Equipment	2014	2015	2016	2014–2016 Average
Total Residential[28]	**$6,352.1**	**$6,631.0**	**$6,364.9**	**$6,449.3**
Total Gas-Fired Equipment	**$247.7**	**$355.1**	**$309.0**	**$303.9**
Gas Heating Equipment	**$112.9**	**$111.0**	**$93.5**	**$105.8**
Fixed Heater	$17.4	$22.1	$22.3	$20.6
Portable Heater	$4.8	$30.1	$5.3	$13.4
Central Heating	$8.5	$12.4	$21.2	$14.0
Fireplace, Chimney, Connector	$55.8	$8.0	$15.7	$26.5
Water Heater	$16.6	$31.9	$21.1	$23.2
Fixed, Central Air Conditioning	$0.1	$0.2	*	$0.1
Other	$9.7	$6.2	$7.8	$7.9
Gas Cooking Equipment	**$66.0**	**$127.0**	**$90.2**	**$94.4**
Range/Oven	$40.3	$47.2	$40.0	$42.5
Open Gas Grill	$16.1	$64.9	$35.4	$38.8
Other	$9.7	$14.9	$14.8	$13.1
Other Selected Gas Equipment	**$56.3**	**$42.1**	**$44.3**	**$47.6**
Clothes Dryer	$10.5	$13.4	$16.6	$13.5
Torch	$33.6	$15.1	$18.5	$22.4
Shop/Garden Tool	$12.1	$13.7	$9.1	$11.6

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 2014 through 2016.

Table 6. NFPA Estimates of Residential Structure Fires and Associated Losses 2014–2016

	2014	2015	2016
Structure Fires	386,500	388,000	371,500
Civilian Deaths	2,795	2,605	2,800
Civilian Injuries	12,175	11,575	11,125
Property Loss	$6.99 billion	$7.21 billion	$7.42 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 2014, 2015, and 2016. Not all the states reporting included data from every fire department in the state. The number of fire departments participating in NFIRS increased from 21,980 in 2014 to 22,610 in 2015 and then to 23,120 in 2016. Table 7 shows the number of residential structure fires and the corresponding losses reported to USFA from 2014 through 2016.

[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 2014–2016

	2014	2015	2016
Structure Fires	272,209	269,521	270,186
Civilian Deaths	1,489	1,503	1,607
Civilian Injuries	7,147	6,872	6,595
Property Loss	$4.50 billion	$4.46 billion	$4.87 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 382,000 residential structure fires in the United States during 2014 to 2016, and an annual average of 2,730 deaths, 11,630 injuries, and $7.2 billion in property losses. NFIRS captured about 71 percent of these fires, 56 percent of the deaths, 59 percent of the injuries, and 64 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 in 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 that 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.
Factors Contributing to Ignition	The event that allowed the heat source and the item first ignited to combine to start the fire. These add specificity to the cause of ignition, such as playing with heat source, heat source too close to combustibles, equipment malfunction.

* See discussion on child play later in this section.

Human Factors Contributing to Ignition	Factors relating to the person or persons involved with the start of the fire. Examples are asleep, possibly impaired by alcohol or drugs, age, unattended or unsupervised person.
Age	Age of the person, if age was considered a factor in contributing to the ignition of the fire.

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, Equipment Portability, Factors Contributing to Ignition, Human Factors Contributing to Ignition, and Age are not required fields. In the change that was incorporated beginning with 2012 data, Equipment Involved became required if certain Heat Source or Factor Contributing to Ignition codes were entered. Beginning in 2015, Equipment Involved reverted to not being a required field, no matter what Heat Source is coded. 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]

In the change that was incorporated beginning with 2012 data, Equipment Involved became a required field if certain Heat Source or Factor Contributing to Ignition codes were entered. This, not surprisingly, led to a smaller proportion of missing data for Equipment Involved in 2012, 2013, and 2014. Because the code "NNN – No equipment involved in ignition" was also not permitted for fires with these particular Heat Source and Factor Contributing to Ignition codes, the proportion of fires coded as "NNN – No equipment involved in ignition" is much lower in 2012, 2013, and 2014, than in previous years. Requiring Equipment Involved to be coded if certain Heat Source[31] codes are entered also appears to have led to entering fewer fires with those Heat Source codes in 2012, 2013, and 2014.

In 2015, when Equipment Involved in Ignition reverted to not being required, even when the Heat Source coded implied that equipment was involved, the proportion of fires coded in the affected Equipment Involved in Ignition codes did not revert to the pre-2012 levels. For example, from 2009 to 2011, 37.3 percent of NFIRS nonconfined residential structure fires were coded as "NNN – No equipment involved in ignition." For 2012 through 2014, when that code was not permitted for fires with certain Heat Source codes, that proportion dropped to 32.1 percent. In 2015, when coders were again permitted to "NNN – No equipment involved," no matter the Heat Source, 31.6 percent of residential structure fires were coded as "NNN – No equipment involved." That proportion was at 32.1 percent again in 2016.

In 2009 to 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 to 2014, that proportion dropped to 36.0 percent. In 2015, it was 41.3 percent, and in 2016, it was 43.4 percent. In 2009 to 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." Between 2012 and 2014, when the new rule required 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 it was 6.6 percent, and in 2016 it was 6.0 percent.

[30] NFIRS Complete Reference Guide, January 2015.

[31] There are four of these heat source codes: "10 – Heat from powered equipment, other"; "11 – Spark, ember, or flame from operating equipment"; "12 – Radiated, conducted heat from operating equipment"; "13 – Arcing."

CPSC staff had a decision to make. When staff was first producing NFIRS estimates for 2012 fires, 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. When the rule changed back in 2015, the coding practices did not revert back, or at least not all the way back, to pre-2012 practices. Perhaps some coders had formed the habit of coding Equipment Involved in Ignition for these fires, and continued to do so beyond when it was required. Over time, these newer habits could erode as there is turnover among coders at NFIRS fire departments. CPSC staff determined it did not seem possible to produce estimates that were completely comparable to 2011, or 2014 in a repeatable and defensible way.

CPSC staff chose instead to stop making these adjustments beginning with the 2015 data. This means a large increase in estimates for particular products. Staff understands that this increase is likely, to a large degree, a function of the rule change having a lasting effect on some coding behavior, and not the result of an actual increase in these types of fires.

Estimates for equipment fires and associated losses were much higher in 2015 than in previous years because of the decision to stop adjusting the data back to pre-2012 levels. The 2015 proportion of residential structure fires with an Equipment Involved in Ignition code that was missing or unknown was higher than the 2012–2014 levels, but did not revert to the pre-2012 levels. The proportion in 2016 was higher than 2015, but still far from the pre-2012 levels. Similarly, the proportion of fires in various equipment categories *e.g.*, "Heating and Cooling, Electrical Distribution," and "Kitchen and Cooking Equipment" was much higher in 2012–2014 than before 2012. They declined slightly in 2015, but not back to pre-2012 levels. They declined slightly again in 2016, but are still closer to 2012–2014 levels than the pre-2012 levels. Perhaps, as coders learn that they are not forced to code Equipment Involved in Ignition (no matter the Heat Source code) the proportion of missing and unknown Equipment Involved in Ignition codes and the proportions that are coded as "Heating and Cooling," "Electrical Distribution," etc., will return gradually to pre-2012 levels. The estimates move in conjunction with these proportions.

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 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[32] 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, 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.

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

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 fire 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: 2014–2016

Included in Table Categories:	Appear in Tables:	2014	2015	2016
Total Residential	1a, 2a, 3a, 4a, 5a	191,200	193,000	181,000
Total Heating and Cooling Equipment	1a, 3a	29,600	26,700	22,200
Fireplace, Chimney, Connector	*1a, 3a*	*20,800*	*18,300*	*14,500*
Other (Burner/Boiler)	*1a, 3a*	*8,700*	*8,400*	*7,700*
Cooking	1a, 2a	142,900	146,900	139,600
Trash, Rubbish	2a	17,100	17,900	17,900
Incinerator	-	600	600	500
Trash Compactor	-	900	900	800

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 2014, 2015, or 2016.

Table 8b. Estimated Residential Confined Fire Injuries: 2014–2016

Included in Table Categories:	Appear in Tables:	2014	2015	2016
Total Residential	1c, 2c, 3c, 4c, 5c	1,510	1,420	1,410
Total Heating and Cooling Equipment	1c, 3c	80	40	30
Fireplace, Chimney, Connector	*1c, 3c*	*30*	*20*	*20*
Other (Burner/Boiler)	*1c, 3c*	*40*	*30*	*10*
Cooking	1c, 2c	1,360	1,310	1,330
Trash, Rubbish	2c	70	60	50
Incinerator	-	*	*	*
Trash Compactor	-	*	*	*

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): 2014–2015

Included in Table Categories:	Appear in Tables:	2014	2015	2016
Total Residential	1d, 2d, 3d, 4d, 5d	$40.8	$44.2	$42.1
Total Heating and Cooling Equipment	1d, 3d	$9.1	$8.5	$7.9
Fireplace, Chimney, Connector	*1d, 3d*	*$7.1*	*$6.3*	*$6.0*
Other (Burner/Boiler)	*1d, 3d*	*$2.0*	*$2.3*	*$1.9*
Cooking	1d, 2d	$28.7	$32.1	$31.0
Trash, Rubbish	2d	$2.6	$2.7	$2.6
Incinerator	-	$0.4	$0.7	$0.4
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: 2014–2016

	2014	2015	2016
Cause of Ignition	35%	34%	34%
Heat Source	39%	39%	40%
Item First Ignited	39%	39%	41%
Equipment Involved	37%	41%	43%
Equipment Power	37%	41%	43%

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: 2014–2016

	2014	2015	2016
Cause of Ignition	62%	60%	59%
Heat Source	64%	63%	63%
Item First Ignited	63%	64%	63%
Equipment Involved	52%	55%	51%
Equipment Power	52%	53%	51%

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

Table 9c. Missing Data on Residential Structure Fire Injuries: 2014–2016

	2014	2015	2016
Cause of Ignition	38%	39%	39%
Heat Source	37%	39%	39%
Item First Ignited	36%	37%	36%
Equipment Involved	29%	34%	35%
Equipment Power	29%	34%	34%

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.[33] The raking procedure maintains the marginal distributions for the known data, while allocating the unknown data for all characteristics involved.[34] 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 ranking 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 2012–2014 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).

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, now CPSC staff 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.

[33] 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.

[34] 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.

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 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 2014, 2015, and 2016 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 35 cases from 2016 where 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, 19 cases had fire cause information edited. In three instances, the investigation concluded that the deaths involved occurred before the fires and 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 and 2016 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 2016, there were 44 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 39 of these incidents to field investigators to try to identify the heat source of each of these fires. These 39 fires led to 40 deaths and 19 nonfatal injuries.

Of these 39 fatal fires, 12 were coded with a Heat Source of “43 – Hot ember or ash” and 27 were coded “60 – Heat from other open flame or smoking materials.” Of the 12 deadly fires that were coded as “Hot ember or ash,” an investigation was completed in eight of them. From those eight investigations, CPSC staff edited the Heat Source in seven of them, including five where CPSC staff changed the Heat Source to “61 – Cigarette.” In another incident, the Heat Source was changed to “62 – Pipe or cigar,” and in the seventh, the “Heat Source” was changed to “UU – Undetermined heat source,” which means it was then subject to allocation. Of the 27 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 19 of them. From these 19 completed investigations, information was provided such that CPSC staff changed the Heat Source in 17 of them, including six 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 and 2016 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 the 2015 and 2016 estimates in this report, and for the estimates for subsequent years, 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 they 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 is already evident from the 2015 and 2016 estimates.

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 ranking from misbehaving even if the proportion of data that is unknown (particularly for deadly fire Heat Sources) continues to rise.

The third change is that quality control editing for 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 is determined to improve the accuracy of its estimates where it is practicable.

Comparisons between 2015 and 2016 estimates and estimates for previous years should be made with caution because these changes have an effect on the estimates.