National Estimates Methodology for Building Fires and Losses

FEMA

This page was intentionally left blank.

U.S. Fire Administration

Mission Statement

We provide National leadership to foster a solid foundation for our fire and emergency services stakeholders in prevention, preparedness, and response.

This page was intentionally left blank.

Table of Contents

This page was intentionally left blank.

Introduction

This documentation details the U.S. Fire Administration's (USFA's) current fire data estimation methodology for all building (i.e., residential and nonresidential) fires and associated losses. The documentation consists of three sections:

- An overview of national estimates that defines what national estimates are; describes the overall approach and methodology used to derive them; and summarizes the basic issues with this current, accepted approach. This national estimates methodology serves as the basis for the computation of USFA's building fire estimates.

- A discussion of what is meant by "buildings" versus "structures" and the implications these classifications have on deriving estimates of the fire problem that are meaningful to the public and prevention efforts.

- A step-by-step methodology which describes how USFA computes national estimates of building fires and associated losses using data from USFA's National Fire Incident Reporting System (NFIRS) and estimates from the National Fire Protection Association's (NFPA's) annual Survey of Fire Departments for U.S. Fire Experience. Formulas for each type of estimate, 32 in all, are given.

The methodology outlined is a critical component of the USFA's analysis of the United States fire problem. USFA uses the national building fire estimates in the Fire Estimate Summary Series, Topical Fire Report Series, and various other fire data reports.

National Estimates Overview

National estimates are estimates of the numbers of fire losses (fires, deaths, injuries, dollar loss) associated with a subset of the fire data. High level summary national estimates of the numbers for fires, deaths, injuries, and dollar loss are based on NFPA's annual Survey of Fire Departments for U.S. Fire Experience. With the exception of the NFPA estimates for total fires, structure (i.e., residential and nonresidential) fires, vehicle, outside, and other fires, all other estimates are scaled-up national estimates or percentages, not just the raw totals from NFIRS. Because the NFIRS 5.0 data are not based on a statistically selected sample and do not represent a "complete" census of fire incidents, the raw NFIRS data must be scaled up to national estimates. These estimates are based on a method of apportioning the NFPA estimates for total fires, structure, vehicle, outside, and other fires.[1] Generally speaking, the national estimates are derived by computing a percentage of fires, deaths, injuries, or dollar loss in a particular NFIRS category and multiplying it by the corresponding total estimate from the NFPA annual survey.[2] This methodology is the accepted practice of national fire data analysts.

Ideally, one would like to have all of the data come from one consistent data source. Because the "residential population protected" is not reported to NFIRS by many fire departments and the reliability of that data element is suspect in many other cases, especially where a county or other jurisdiction is served by several fire departments that each report their population protected independently, this data element is not used. Instead, extrapolations of the NFIRS sample to national estimates are made using the NFPA survey for the gross totals of fires, deaths, injuries, and dollar loss.

---

[1] National estimates are based on "The National Estimates Approach to U.S. Fire Statistics" by Hall and Harwood: http://www.nfpa.org/assets/files/PDF/Research/Nationalestimates.pdf.

[2] The NFPA summary estimates are used for the overall U.S. fire losses; fire losses from structure, vehicle, outside, and other fires; and as the basis for USFA's estimates of residential and nonresidential building fires. The alternative approach for these summary numbers is to use the relative percentage of fires (or other loss measures) from NFIRS and scale up (multiply by) the NFPA estimate of total fires.

One problem with this approach is that the proportions of fires and fire losses differ between the large NFIRS sample and the NFPA survey sample.[3] Nonetheless, to be consistent with approaches being used by other fire data analysts, the NFPA estimates of fires, deaths, injuries, and dollar loss are used as a starting point. The details of the fire problem below this level are based on proportions from NFIRS. Because the proportions of fires and fire losses differ between NFIRS and the NFPA estimates, from time to time, this approach leads to minor inconsistencies. These inconsistencies will remain until all estimates can be derived from NFIRS data alone.

Structures Versus Buildings

NFIRS 5.0 allows for the differentiation between buildings and nonbuildings. In NFIRS, a structure is a built object and can include platforms, tents, connective structures (e.g., bridges, fences), telephone poles, and various other structures in addition to buildings. Analyses of NFIRS structure fires show that, by and large, the majority (93 percent) of structure fires occurs in buildings.

The distinction between buildings and nonbuildings is particularly important when determining the effectiveness of nonbehavior-based fire safety mechanisms such as smoke alarms and residential sprinklers. These important components of early fire detection apply to buildings and not necessarily to these other types of structures. To facilitate analysis of these components and to acknowledge that prevention efforts generally are centered on buildings, USFA separates buildings from the rest of the structures. For these reasons, USFA focuses on producing building fire and loss estimates.

National Building Fire and Loss Estimates

The following methodology describes how USFA computes national estimates of building fires and associated losses using data from the NFIRS and estimates from the NFPA's annual Survey of Fire Departments for U.S. Fire Experience.[4]

To compute the annual national estimate of building fires,[5] the following formula is used:

Formula 1
National Estimate of Building Fires =
$$\frac{\text{NFIRS raw count of building fires}}{\text{NFIRS raw count of structure fires}} * \text{NFPA estimate of structure fires}$$

Formula 1 is modified to compute national estimates of building fire deaths and fire injuries. For example, to compute the national estimate of building fire deaths, replace the term "fires" with "fire deaths" in formula 1. To compute the annual national estimate of building fire deaths and injuries,[6] the following formulas are used:

---

[3] These differences are discussed in Appendix A of USFA's report: "Fire in the United States (2003–2007) 15th Edition"—http://www.usfa.fema.gov/downloads/pdf/statistics/fa_325.pdf.   Better estimates of fire loss measures from NFIRS will not be available until a more robust method of estimation is developed.

[4] NFPA's annual survey estimates of the fire problem are available at: http://www.nfpa.org/categoryList.asp?categoryID=951&URL=Research/Fire%20statistics.

[5] For definitions of NFIRS building fires and NFIRS structure fires, please see the USFA's National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues documentation: http://www.usfa.fema.gov/downloads/pdf/publications/nfirs_data_analysis_guidelines_issues.pdf.

[6] For definitions of NFIRS fire deaths and injuries, please see the USFA's National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues documentation: http://www.usfa.fema.gov/downloads/pdf/publications/nfirs_data_analysis_guidelines_issues.pdf.

Formula 2

National Estimate of Building Fire Deaths =

$$\frac{\text{NFIRS raw count of building fire deaths}}{\text{NFIRS raw count of structure fire deaths}} * \text{NFPA estimate of structure fire deaths}$$

Formula 3

National Estimate of Building Fire Injuries =

$$\frac{\text{NFIRS raw count of building fire injuries}}{\text{NFIRS raw count of structure fire injuries}} * \text{NFPA estimate of structure fire injuries}$$

The following formula illustrates the computation of building fire dollar-loss estimates:

Formula 4

National Estimate of Building Fire Dollar Loss =

$$\frac{\text{NFIRS raw summation of building fire \$ loss}}{\text{NFIRS raw summation of structure fire \$ loss}} * \text{NFPA estimate of structure fire \$ loss} * \text{CPI conversion}$$

For USFA's estimates of building fire dollar loss, USFA adjusts prior year dollar loss for inflation to the current year dollar loss using the Consumer Price Index (CPI) conversion.[7] The Bureau of Labor Statistics (BLS) defines the CPI as a measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services.[8] The CPI conversion value for the current year data is equal to 1.0. The Attachment at the end of this document includes the CPI conversion table for 1990–2010.

For presentation of results, USFA rounds estimates of building fires to the nearest 100 fires. National estimates of fire deaths are rounded to the nearest 5 deaths and fire injuries are rounded to the nearest 25 injuries. National estimates of building fire dollar loss are rounded to the nearest 100,000 dollars. For subsequent calculations using national estimates of building fires, USFA uses unrounded estimates.

---

[7] Total fire dollar loss is defined in the USFA's National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues documentation: http://www.usfa.fema.gov/downloads/pdf/publications/nfirs_data_analysis_guidelines_issues.pdf.

[8] U.S. Department of Labor, Bureau of Labor Statistics: http://www.bls.gov/cpi/home.htm.

Residential Buildings

National Residential Building Fire and Loss Estimates

The following methodology describes how USFA computes national estimates of residential building fires using data from NFIRS and estimates from the NFPA's annual survey. In this section, formulas 1–4 are modified to compute national estimates of residential building fires and accompanying losses by adding the term "residential" to each component of the formulas.

To compute the annual national estimate of residential building fires,[9] the following formula is used:

Formula 5

National Estimate of Residential Building Fires =

$$\frac{\text{NFIRS raw count of residential building fires}}{\text{NFIRS raw count of residential structure fires}} * \text{NFPA estimate of residential structure fires}$$

To compute the annual national estimate of residential building fire deaths and injuries, the following formulas are used:

Formula 6

National Estimate of Residential Building Fire Deaths =

$$\frac{\text{NFIRS raw count of residential building fire deaths}}{\text{NFIRS raw count of residential structure fire deaths}} * \text{NFPA estimate of residential structure fire deaths}$$

Formula 7

National Estimate of Residential Building Fire Injuries =

$$\frac{\text{NFIRS raw count of residential building fire injuries}}{\text{NFIRS raw count of residential structure fire injuries}} * \text{NFPA estimate of residential structure fire injuries}$$

The following formula illustrates the computation of residential building fire dollar-loss estimates:

Formula 8

National Estimate of Residential Building Fire Dollar Loss =

$$\frac{\text{NFIRS raw summation of residential building fire \$ loss}}{\text{NFIRS raw summation of residential structure fire \$ loss}} * \text{NFPA estimate of residential structure fire \$ loss} * \text{CPI conversion}$$

USFA rounds estimates of residential building fires to the nearest 100 fires. For residential buildings, national estimates of fire deaths are rounded to the nearest 5 deaths, fire injuries are rounded to the nearest 25 injuries, and fire dollar loss is rounded to the nearest 100,000 dollars.

---

[9] For definitions of NFIRS residential building fires and NFIRS residential structure fires, please see the USFA's National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues documentation: http://www.usfa.fema.gov/downloads/pdf/publications/nfirs_data_analysis_guidelines_issues.pdf.

National Residential Building Fire and Loss Estimates by Major Property Use

Residential building fire and loss estimates for one- and two-family residences, multifamily residences, and other residences are computed based on the overall residential building fire and loss estimates computed in the previous section.[10]

To compute the annual national estimate of one- and two-family building fires, the following formula is used:

Formula 9

National Estimate of One- and Two-Family Residential Building Fires =

$$\frac{\text{NFIRS raw count of one- and two-family residential building fires}}{\text{NFIRS raw count of residential building fires}} * \text{National estimate of residential building fires}$$

Note: For consistency, USFA uses the unrounded national estimate of residential building fires in the above formula. This is true for all of the remaining formulas used to compute residential estimates.

To compute the annual national estimate of one- and two-family building fire deaths, the following formula is used:

Formula 10

National Estimate of One- and Two-Family Residential Building Fire Deaths =

$$\frac{\text{NFIRS raw count of one- and two-family residential building fire deaths}}{\text{NFIRS raw count of residential building fire deaths}} * \text{National estimate of residential building fire deaths}$$

Formula 10 can be modified to compute the national estimate of one- and two-family building fire injuries by substituting the term "fire injuries" for "fire deaths" as follows:

Formula 11

National Estimate of One- and Two-Family Residential Building Fire Injuries =

$$\frac{\text{NFIRS raw count of one- and two-family residential building fire injuries}}{\text{NFIRS raw count of residential building fire injuries}} * \text{National estimate of residential building fire injuries}$$

The following formula illustrates the computation of national one- and two-family building fire dollar-loss estimates:

Formula 12

National Estimate of One- and Two-Family Residential Building Fire Dollar Loss =

$$\frac{\text{NFIRS raw summation of one-and two-family residential building fire \$ loss}}{\text{NFIRS raw summation of residential building fire \$ loss}} * \text{National estimate of residential building fire \$ loss}$$

Note: Formula 12 does not require the CPI adjustment since it was already applied in computing the national estimate of residential building fire dollar loss.

---

[10] One- and two-family, multifamily, and other residential building fires are defined in the USFA's National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues documentation: http://www.usfa.fema.gov/downloads/pdf/publications/nfirs_data_analysis_guidelines_issues.pdf.

Formulas 9–12 can also be used to compute the national estimates of multifamily residential building and other residential building fires, deaths, injuries, and dollar loss by substituting the appropriate property use designation for "one- and two-family residential buildings" in the numerator of each formula. USFA rounds estimates of one- and two-family, multifamily, and other residential building fires to the nearest 100 fires. Estimates of deaths are rounded to the nearest 5, injuries to the nearest 25, and dollar loss to the nearest 100,000 dollars.

National Residential Building Fire and Loss Estimates by Fire Cause

As part of USFA's Fire Estimate Summary Series, estimates of fire causes are computed for residential buildings. USFA's structure fire cause methodology is used to determine the cause of residential building fires and losses. A detailed description of the structure fire cause methodology can be found at: http://www.usfa.fema.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm.

Based on the structure fire cause methodology, fires are assigned to 1 of 16 mid-level, mutually exclusive categories of fire causes such as heating, cooking, smoking, and playing with a heat source, to name a few. Additionally, there is an unknown cause category for fires whose causes were not reported to NFIRS.

In making national estimates, fires with unknown causes should not be ignored. The approach taken by USFA is to compute "adjusted" percentages using only those incidents for which causal data were provided. This calculation, in effect, distributes the fires for which the cause data are unknown in the same proportion as the fires for which the causes are known, which may or may not be approximately right.

The following general formula can be used to compute the annual national estimate of residential building fires with a specific fire cause:

Formula 13

National Estimate of Residential Building Fires with Specified Cause =

$$\frac{\text{NFIRS raw count of residential building fires with specified cause}}{\text{NFIRS raw count of residential building fires with known cause}} * \text{National estimate of residential building fires}$$

Formula 13 can be modified to compute the national estimates of residential building fires for each of the cause categories. For example, to determine the national estimate of residential building cooking fires, the formula is modified as shown:

Formula 14

National Estimate of Residential Building Cooking Fires =

$$\frac{\text{NFIRS raw count of residential building cooking fires}}{\text{NFIRS raw count of residential building fires with known cause}} * \text{National estimate of residential building fires}$$

Formula 13 can also be modified to compute national estimates of residential building fire deaths, injuries, and related dollar loss by various fire causes. For example, to determine the national estimate of residential smoking fire deaths, the following formula can be used:

Formula 15

National Estimate of Residential Building Smoking Fire Deaths =

$$\frac{\text{NFIRS raw count of residential building smoking fire deaths}}{\text{NFIRS raw count of residential building fire deaths with known cause}} * \text{National estimate of residential building fire deaths}$$

To determine the national estimate of residential building heating fire injuries, the following formula can be used:

Formula 16

National Estimate of Residential Building Heating Fire Injuries =

$$\frac{\text{NFIRS raw count of residential building heating fire injuries}}{\text{NFIRS raw count of residential building fire injuries with known cause}} * \text{National estimate of residential building fire injuries}$$

The following formula illustrates the computation of national residential building intentional fire dollar-loss estimates:

Formula 17

National Estimate of Residential Building Intentional Fire Dollar Loss =

$$\frac{\text{NFIRS raw summation of residential building intentional fire \$ loss}}{\text{NFIRS raw summation of residential building fire \$ loss with known cause}} * \text{National estimate of residential building fire \$ loss}$$

Note: Formula 17 does not require the CPI adjustment since it was already applied in computing the national estimate of residential building fire dollar loss.

National estimates of residential building fires with a specific cause are rounded to the nearest 100 fires, deaths to the nearest 5, injuries to the nearest 25, and dollar loss to the nearest 100,000 dollars.

National Estimates of Major Residential Building Property Use Categories by Cause

Formulas 13–17 can also be customized to compute national estimates of the major residential property use categories for fires, deaths, injuries, and dollar loss by cause. For example, to compute the national estimate of intentional fires in multifamily buildings, use the following formula:

Formula 18

National Estimate of Multifamily Building Intentional Fires =

$$\frac{\text{NFIRS raw count of multifamily building intentional fires}}{\text{NFIRS raw count of multifamily building fires with known cause}} * \text{National estimate of multifamily building fires}$$

For national estimates of the major residential property use categories by cause, fires are rounded to the nearest 100 fires, deaths and injuries to the nearest 5, and dollar loss to the nearest 100,000 dollars. National injury estimates computed at this level are rounded to the nearest 5 injuries so that when summing over the cause categories, estimates will be closer to the total rounded estimate for a particular property use category. It is important to note that when computing dollar loss for prior year data, USFA adjusts prior year dollar loss for inflation to the current year dollar loss using the CPI conversion.

Nonresidential Buildings

National Nonresidential Building Fire and Loss Estimates

The following methodology describes how USFA computes national estimates of nonresidential building fires using data from NFIRS and estimates from the NFPA's annual survey. In this section, formulas 1–4 are modified to compute national estimates of nonresidential building fires and accompanying losses by adding the term "nonresidential" to each component of the formulas.

To compute the annual national estimate of nonresidential building fires,[11] the following formula is used:

Formula 19

National Estimate of Nonresidential Building Fires =

$$\frac{\text{NFIRS raw count of nonresidential building fires}}{\text{NFIRS raw count of nonresidential structure fires}} * \text{NFPA estimate of nonresidential structure fires}$$

To compute the annual national estimate of nonresidential building fire deaths and injuries, the following formulas are used:

Formula 20

National Estimate of Nonresidential Building Fire Deaths =

$$\frac{\text{NFIRS raw count of nonresidential building fire deaths}}{\text{NFIRS raw count of nonresidential structure fire deaths}} * \text{NFPA estimate of nonresidential structure fire deaths}$$

Formula 21

National Estimate of Nonresidential Building Fire Injuries =

$$\frac{\text{NFIRS raw count of nonresidential building fire injuries}}{\text{NFIRS raw count of nonresidential structure fire injuries}} * \text{NFPA estimate of nonresidential structure fire injuries}$$

The following formula illustrates the computation of nonresidential building fire-dollar loss estimates.

Formula 22

National Estimate of Nonresidential Building Fire Dollar Loss =

$$\frac{\text{NFIRS raw summation of nonresidential building fire \$ loss}}{\text{NFIRS raw summation of nonresidential structure fire \$ loss}} * \text{NFPA estimate of nonresidential structure fire \$ loss} * \text{CPI conversion}$$

For USFA's estimates of nonresidential building fire dollar loss, USFA adjusts prior year dollar loss for inflation to the current year dollar loss using the CPI conversion. The CPI conversion value for the current year data is equal to 1.0.

USFA rounds national estimates of nonresidential building fires to the nearest 100 fires. National estimates of nonresidential building fire deaths are rounded to the nearest 5 deaths, fire injuries are rounded to the nearest 25 injuries, and dollar loss is rounded to the nearest 100,000 dollars.

[11] For definitions of NFIRS nonresidential building fires and NFIRS nonresidential structure fires, please see the USFA's National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues documentation: http://www.usfa.fema.gov/downloads/pdf/publications/nfirs_data_analysis_guidelines_issues.pdf.

National Nonresidential Building Fire and Loss Estimates by Major Property Use

Nonresidential building fire and loss estimates for various property use categories such as assembly, educational, medical facilities, etc., are computed based on the overall nonresidential building fire and loss estimates computed in the previous section.[12] For example, the formula for the annual national estimate of assembly building fires is:

Formula 23

National Estimate of Assembly Building Fires =

$$\frac{\text{NFIRS raw count of assembly building fires}}{\text{NFIRS raw count of nonresidential building fires}} * \text{National estimate of nonresidential building fires}$$

Note: For consistency, USFA uses the unrounded national estimate of nonresidential building fires in the above formula. This is true for all remaining formulas in the document as well.

To compute the annual national estimate of assembly building fire deaths, the following formula is used:

Formula 24

National Estimate of Assembly Building Fire Deaths =

$$\frac{\text{NFIRS raw count of assembly building fire deaths}}{\text{NFIRS raw count of nonresidential building fire deaths}} * \text{National estimate of nonresidential building fire deaths}$$

Formula 24 can be modified to compute the national estimate of assembly building fire injuries by substituting the term "fire injuries" for "fire deaths" as follows:

Formula 25

National Estimate of Assembly Building Fire Injuries =

$$\frac{\text{NFIRS raw count of assembly building fire injuries}}{\text{NFIRS raw count of nonresidential building fire injuries}} * \text{National estimate of nonresidential building fire injuries}$$

To compute the national estimate of assembly building fire-dollar loss, the following formula is used:

Formula 26

National Estimate of Assembly Building Fire Dollar Loss =

$$\frac{\text{NFIRS raw summation of assembly building fire \$ loss}}{\text{NFIRS raw summation of nonresidential building fire \$ loss}} * \text{National estimate of nonresidential building fire \$ loss}$$

Note: Formula 26 does not require the CPI adjustment since it was already applied in computing the national estimate of nonresidential building fire dollar loss.

---

[12] Nonresidential building property use categories are defined in the USFA's National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues documentation: http://www.usfa.fema.gov/downloads/pdf/publications/nfirs_data_analysis_guidelines_issues.pdf.

Formulas 23–26 can also be used to compute the national estimates of nonresidential building fires, deaths, injuries, and dollar loss for the other property use categories by substituting the appropriate property use designation for "assembly building" in the numerator of each formula. USFA rounds estimates of nonresidential building fires by property use categories to the nearest 100 fires. Estimates of deaths are rounded to the nearest 5, injuries to the nearest 25, and dollar loss to the nearest 100,000 dollars.

Note: Estimates of fire deaths with < 3 deaths indicate insufficient data are available to compute national level estimates.

National Nonresidential Building Fire and Loss Estimates by Fire Cause

As part of USFA's Fire Estimate Summary Series, estimates of fire causes are also computed for nonresidential buildings. USFA's structure fire cause methodology is used to determine the cause of nonresidential building fires and losses. As previously noted, the detailed description of the structure fire cause methodology can be found at: http://www.usfa.fema.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm.

The following general formula can be used to compute the annual national estimate of nonresidential building fires with a specific fire cause:

Formula 27

National Estimate of Nonresidential Building Fires with Specified Cause =

$$\frac{\text{NFIRS raw count of nonresidential building fires with specified cause}}{\text{NFIRS raw count of nonresidential building fires with known cause}} * \text{National estimate of nonresidential building fires}$$

Formula 27 can be modified to compute the national estimates of residential building fires for each of the cause categories. For example, to determine the national estimate of nonresidential building cooking fires, the formula is modified as shown:

Formula 28

National Estimate of Nonresidential Building Cooking Fires =

$$\frac{\text{NFIRS raw count of nonresidential building cooking fires}}{\text{NFIRS raw count of nonresidential building fires with known cause}} * \text{National estimate of nonresidential building fires}$$

Formula 27 can also be modified to compute national estimates of nonresidential building fire deaths, injuries, and related dollar loss by various fire causes. For example, to determine the national estimate of nonresidential smoking fire deaths, the following formula can be used:

Formula 29

National Estimate of Nonresidential Building Smoking Fire Deaths =

$$\frac{\text{NFIRS raw count of nonresidential building smoking fire deaths}}{\text{NFIRS raw count of nonresidential building fire deaths with known cause}} * \text{National estimate of nonresidential building fire deaths}$$

To determine the national estimate of nonresidential building heating fire injuries, the following formula can be used:

Formula 30

National Estimate of Nonresidential Building Heating Fire Injuries =

$$\frac{\text{NFIRS raw count of nonresidential building heating fire injuries}}{\text{NFIRS raw count of nonresidential building fire injuries with known cause}} * \text{National estimate of nonresidential building fire injuries}$$

The following formula illustrates the computation of national nonresidential building intentional fire dollar-loss estimates:

Formula 31

National Estimate of Nonresidential Building Intentional Fire Dollar Loss =

$$\frac{\text{NFIRS raw summation of nonresidential building intentional fire \$ loss}}{\text{NFIRS raw summation of nonresidential building fire \$ loss with known cause}} * \text{National estimate of nonresidential building fire \$ loss}$$

Note: Formula 31 does not require the CPI adjustment since it was already applied in computing the national estimate of nonresidential building fire dollar loss.

National estimates of nonresidential building fires with a specific cause are rounded to the nearest 100 fires, deaths to the nearest 5, injuries to the nearest 25, and dollar loss to the nearest 100,000 dollars.

Note: In USFA's Fire Estimate Summary Series, deaths and injuries by individual causes are not produced, as small numbers of nonresidential building casualties are reported to NFIRS and a large number of the fires that caused these casualties have insufficient information to determine fire cause.

National Estimates of Major Nonresidential Building Property Use Categories by Cause

Formulas 27–31 can also be customized to compute national estimates of the major residential property use categories for fires, deaths, injuries, and dollar loss by cause. For example, to compute the national estimate of intentional fires in assembly buildings, use the following formula:

Formula 32

National Estimate of Assembly Building Intentional Fires =

$$\frac{\text{NFIRS raw count of assembly building intentional fires}}{\text{NFIRS raw count of assembly building fires with known cause}} * \text{National estimate of assembly building fires}$$

For national estimates of the major nonresidential property use categories by cause, fires are rounded to the nearest 100 fires, deaths and injuries to the nearest 5, and dollar loss to the nearest 100,000 dollars. National injury estimates computed at this level are rounded to the nearest 5 injuries so that when summing over the cause categories, estimates will be closer to the total rounded estimate for a particular property use category.

Note: In USFA's Fire Estimate Summary Series, deaths and injuries by individual causes are not produced as small numbers of nonresidential building casualties are reported to NFIRS and a large number of the fires that caused these casualties have insufficient information to determine fire cause. Additionally, it is important to note that when computing dollar loss for prior year data, USFA adjusts prior year dollar loss for inflation to the current year dollar loss using the CPI conversion.

Attachment: Consumer Price Index (CPI) Conversion Table

Year	change	index	convert 01	convert 02	convert 03	convert 04	convert 05	convert 06	convert 07	convert 08	convert 09	convert 10
1990		130.7	1.3550	1.3764	1.4078	1.4453	1.4943	1.5425	1.5864	1.6473	1.6414	1.6684
1991		136.2	1.3003	1.3209	1.3510	1.3869	1.4339	1.4802	1.5223	1.5808	1.5752	1.6010
1992		140.3	1.2623	1.2823	1.3115	1.3464	1.3920	1.4369	1.4778	1.5346	1.5291	1.5542
1993		144.5	1.2256	1.2450	1.2734	1.3073	1.3516	1.3952	1.4349	1.4900	1.4847	1.5090
1994	2.6%	148.2	1.1950	1.2139	1.2416	1.2746	1.3178	1.3603	1.3991	1.4528	1.4476	1.4714
1995	2.8%	152.4	1.1621	1.1804	1.2073	1.2395	1.2815	1.3228	1.3605	1.4127	1.4077	1.4308
1996	3.0%	156.9	1.1287	1.1466	1.1727	1.2040	1.2447	1.2849	1.3215	1.3722	1.3673	1.3898
1997	2.3%	160.5	1.1034	1.1209	1.1464	1.1769	1.2168	1.2561	1.2919	1.3415	1.3367	1.3586
1998	1.6%	163.0	1.0865	1.1037	1.1288	1.1589	1.1982	1.2368	1.2720	1.3209	1.3162	1.3378
1999	2.2%	166.6	1.0630	1.0798	1.1044	1.1339	1.1723	1.2101	1.2445	1.2923	1.2877	1.3089
2000	3.4%	172.2	1.0285	1.0447	1.0685	1.0970	1.1341	1.1707	1.2041	1.2503	1.2459	1.2663
2001	2.8%	177.1	1.0000	1.0158	1.0390	1.0666	1.1028	1.1383	1.1708	1.2157	1.2114	1.2313
2002	1.6%	179.9	0.9844	1.0000	1.0228	1.0500	1.0856	1.1206	1.1525	1.1968	1.1925	1.2121
2003	2.3%	184.0	0.9625	0.9777	1.0000	1.0266	1.0614	1.0957	1.1269	1.1701	1.1660	1.1851
2004	2.7%	188.9	0.9375	0.9524	0.9741	1.0000	1.0339	1.0672	1.0976	1.1398	1.1357	1.1543
2005	3.4%	195.3	0.9068	0.9211	0.9421	0.9672	1.0000	1.0323	1.0617	1.1024	1.0985	1.1165
2006	3.2%	201.6	0.8785	0.8924	0.9127	0.9370	0.9688	1.0000	1.0285	1.0680	1.0642	1.0816
2007	2.8%	207.342	0.8541	0.8676	0.8874	0.9111	0.9419	0.9723	1.0000	1.0384	1.0347	1.0517
2008	3.8%	215.303	0.8226	0.8356	0.8546	0.8774	0.9071	0.9364	0.9630	1.0000	0.9964	1.0128
2009	-0.4%	214.537	0.8255	0.8385	0.8577	0.8805	0.9103	0.9397	0.9665	1.0036	1.0000	1.0164
2010	1.6%	218.056	0.8122	0.8250	0.8438	0.8663	0.8956	0.9245	0.9509	0.9874	0.9839	1.0000

Source: http://www.bls.gov/cpi/cpi1998d.htm "How to Use the Consumer Price Index for Escalation." Escalation agreements using the CPI usually involve changing the base payment by the percent change in the level of the CPI between the reference period and a subsequent time period. This is calculated by first determining the index point change between the two periods and then the percent change. The following example illustrates the computation of percent change:

CPI for current period	136
Less CPI for previous period	129.9
Equals index point change	6.1
Divided by previous period CPI	129.9
Equals	0.047
Result multiplied by 100	0.047 x 100
Equals percent change	4.7
Source:	ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt