U.S. Fire Administration/National Fire Data Center

Data Sources and National Estimates Methodology Overview for the U.S. Fire Administration's Topical Fire Report Series (Volume 15)

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FEMA

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Mission Statement

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

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Background

The topical reports produced as part of the U.S. Fire Administration's (USFA's) Topical Fire Report Series explore facets of the fire problem in the United States as depicted through data collected in USFA's National Fire Incident Reporting System (NFIRS). Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information. The national estimates presented in the topical reports are based on data from NFIRS and the National Fire Protection Association's (NFPA's) annual Survey of Fire Departments for U.S. Fire Experience.

This document addresses national estimates as well as the data sources used to derive the estimates with an emphasis on the specific NFIRS data elements analyzed in the topical reports. "Unknown" data entries and missing data values are also discussed. Because the majority of USFA's topical reports address fires and losses in buildings, this paper focuses on buildings.

Data Sources

National Fire Incident Reporting System

NFIRS is the world's largest data collection of incidents to which fire departments respond. About 1 million fire incident records and 21 million nonfire incident records are added to the database each year. Fire departments reporting fire incidents to NFIRS grew from 20,432 in 2010 to 20,544 in 2012, the most recent year of data available. Across participating entities, 68 percent of U.S. fire departments reported fire incidents to NFIRS in 2012.[1] With over two-thirds of all fire departments nationwide reporting fire incidents to NFIRS, the reporting departments represent a very large dataset that enables USFA to develop reasonable estimates of various aspects of the fire problem. Although some states do require their departments to participate in the state system, participation in NFIRS is voluntary. Furthermore, if a fire department is a recipient of a Fire Act Grant, participation is required.[2] For the years 2010-2012, data were submitted by all 50 states, the District of Columbia and the Native American Tribal Authorities. It is important to note that all fire departments within participating states do not report to NFIRS.

Because NFIRS incident reports are submitted voluntarily, it is **not** a statistically selected sample. The NFIRS data are not stand-alone. Therefore, USFA currently scales-up raw NFIRS data or percentages to NFPA's annual national survey estimates. This approach is discussed further in the National Estimates Overview section.

National Fire Protection Association Survey Estimates

The NFPA's Survey of Fire Departments for U.S. Fire Experience is based on a stratified random sample of U.S. fire departments.[3] The sample of departments is stratified by size of community protected, and ratio estimation methodology is used to develop national level summary estimates on fire loss statistics (the total numbers of reported fires, fire deaths, fire injuries and direct dollar loss) as well as summary estimates of fires and losses by major incident types (i.e., structure, vehicle, outside and other).

The 2010-2012 NFPA estimates of residential structure fires and losses used to develop USFA's national estimates of residential building fires are presented in Table 1. From 2010 to 2012, the NFPA survey produced an annual average estimate of 383,667 residential structure fires resulting

[1] For 2012, NFPA estimated that there were 30,100 fire departments in the U.S. Source: NFPA, U.S. Fire Department Profile 2012, http://www.nfpa.org/research/reports-and-statistics/the-fire-service/administration/us-fire-department-profile, October 2013.

[2] From the Assistance to Firefighters Grant Guidance and Application Kit (June 2012), if the applicant is a fire department, the department must agree to provide information, through established reporting channels, to NFIRS for the period covered by the assistance. If a fire department does not currently participate in the incident reporting system and does not have the capacity to report at the time of the award, the department must agree to provide information to the system for a 12-month period that begins as soon as the department develops the capacity to report. See http://www.fema.gov/library/viewRecord.do?id=6007 (fg_2012_afg_program_guidance.pdf).

[3] For detailed information regarding NFPA's survey methodology, see NFPA's report on "Fire Loss in the United States," http://www.nfpa.org/~/media/Files/Research/NFPA%20reports/Overall%20Fire%20Statistics/osfireloss.pdf.

in 2,540 civilian fire deaths, 13,778 civilian fire injuries, and $7.1 billion dollars in property damage each year. Of these NFPA residential structure fire and loss estimates, 72 percent of the fires, 58 percent of the deaths, 57 percent of the injuries and 58 percent of the dollar loss were reported to NFIRS during this three-year period.

Table 1. NFPA Estimates of Residential Structure Fires and Losses (2010-2012)

Year	Residential Structure Fires	Residential Structure Fire Deaths	Residential Structure Fire Injuries	Residential Structure Fire Dollar Loss (in millions)
2010	384,000	2,665	13,800	$7,079
2011	386,000	2,550	14,360	$7,054
2012	381,000	2,405	13,175	$7,199

Source: NFPA, "Fire Loss in the United States," 2010-2012.

The 2010-2012 NFPA estimates of nonresidential structure fires and losses used to develop USFA's national estimates of nonresidential building fires are presented in Table 2. From 2010 to 2012, the NFPA survey produced an annual average estimate of 98,667 nonresidential structure fires resulting in 82 civilian fire deaths, 1,473 civilian fire injuries and $2.6 billion dollars in property damage. Of these NFPA nonresidential structure fire and loss estimates, 76 percent of the fires, 95 percent of the deaths, 50 percent of the injuries and 73 percent of the dollar loss were reported to NFIRS during this three-year period.

Table 2. NFPA Estimates of Nonresidential Structure Fires and Losses (2010-2012)

Year	Nonresidential Structure Fires	Nonresidential Structure Fire Deaths	Nonresidential Structure Fire Injuries	Nonresidential Structure Fire Dollar Loss (in millions)
2010	98,000	90	1,620	$2,637
2011	98,500	90	1,275	$2,639
2012	99,500	65	1,525	$2,577

Source: NFPA, "Fire Loss in the United States," 2010-2012.

National Estimates Overview

National estimates presented in USFA's Topical Fire Report Series (Volume 15) are based on 2010-2012 NFIRS data, structure fire-loss estimates from 2010-2012 NFPA's annual surveys and 2010-2012 USFA's building fire-loss estimates.

Overall estimates of the fire problem come from NFPA's annual Survey of Fire Departments for U.S. Fire Experience.[4] As previously noted, this survey produces national level summary estimates on fire loss statistics (the total numbers of reported fires, fire deaths, fire injuries and direct dollar loss) as well as summary estimates of fires and losses by major incident types (i.e., structure, vehicle, outside and other). The summary estimates by major incident type are further broken down to the next tier (e.g., residential structures, highway vehicles and the like). The raw NFPA survey data are not available to the public, USFA or various other national fire data analysts.

All nationally based estimates on subsets of fire data are derived by scaling up the raw NFIRS data. These estimates are based on a method of apportioning the NFPA estimates for total fires, structure, vehicle, outside and other fires.[5] Generally, these 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.[6] This methodology is the accepted practice of national fire data analysts.

[4] For detailed information regarding NFPA's survey methodology, see NFPA's report on "Fire Loss in the United States," http://www.nfpa.org/~/media/Files/Research/NFPA%20reports/Overall%20Fire%20Statistics/osfireloss.pdf.

[5] The foundation of computing national estimates is based on "The National Estimates Approach to U.S. Fire Statistics" by Hall, J. and Harwood, B., http://www.nfpa.org/~/media/6906FADB2CE149488FB5103F4A750A05.ashx.

[6] 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 and losses. 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 dataset and the NFPA survey sample.[7] 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 inconsistencies. These inconsistencies will remain until all estimates can be derived from NFIRS data alone.

Ideally, one would like to have all of the data come from one consistent data source — NFIRS. One of the critical pieces of data necessary to do so is missing: the overall population protected by all reporting fire departments. This "residential population protected" is not reported to NFIRS, nor is the data easy to come by, especially where a county or other jurisdiction is served by several fire departments that each report their fires independently.

Other issues — such as full reporting because of reporting deadlines, data access, budgetary considerations and the like — add a layer of complexity to using the NFIRS data to create estimates. Nonetheless, with such a large wealth of fire incident data, the USFA believes it is possible to harness the NFIRS data to produce national estimates of the U.S. fire problem.

Through the years, a number of ad hoc studies have been undertaken to identify NFIRS nonresponse bias, none of which have identified major reporting issues. Most of the NFIRS data exhibit stability from one year to the next, without radical changes. Results based on the full dataset are generally similar to those based on part of the data, another indication of data reliability. In short, the NFIRS data is a very large and reasonably stable dataset that is used as input to develop national estimates.

Structures Versus Buildings in the National Fire Incident Reporting System

NFIRS allows for the differentiation between buildings and nonbuildings. In NFIRS, a structure is a built object and can include nonbuildings such as platforms, tents, connective structures (e.g., bridges, fences), telephone poles and various other structures in addition to buildings. Analyses of 2010-2012 NFIRS structure fire data show that, by and large, the majority (94 percent) of structure fires occur 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 separately for residential and nonresidential buildings.

Residential Buildings

Table 3 shows the raw numbers of residential building fires and losses reported to NFIRS from 2010 to 2012.

Table 3. Residential Building Fires and Losses Reported to NFIRS (2010-2012)

Year	Residential Building Fires	Residential Building Fire Deaths	Residential Building Fire Injuries	Residential Building Fire Dollar Loss (in millions)
2010	271,085	1,472	7,899	$3,966
2011	270,164	1,459	7,990	$3,994
2012	248,666	1,388	7,191	$3,833

Source: USFA, 2010-2012 NFIRS.

[7] For additional information regarding the differences in proportions of fires and losses between NFIRS data and the NFPA survey, see the section titled Differences Between NFIRS Data and NFPA Survey Data in USFA's "Data Sources and Methodology Documentation," March 2014, http://www.usfa.fema.gov/downloads/pdf/statistics/data_sources_methodology.pdf.

Table 4 shows the raw numbers of residential structure fires and losses reported to NFIRS from 2010 to 2012. On average from 2010 to 2012, 96 percent of residential structure fires, 97 percent of associated deaths, 97 percent of injuries and 96 percent of dollar loss reported to NFIRS occurred in residential buildings.

Table 4. Residential Structure Fires and Losses Reported to NFIRS (2010–2012)

Year	Residential Structure Fires	Residential Structure Fire Deaths	Residential Structure Fire Injuries	Residential Structure Fire Dollar Loss (in millions)
2010	287,476	1,536	8,207	$4,224
2011	286,103	1,519	8,254	$4,236
2012	253,333	1,400	7,259	$3,885

Source: USFA, 2010-2012 NFIRS.

Nonresidential Buildings

Table 5 shows the raw numbers of nonresidential building fires and losses reported to NFIRS from 2010 to 2012.

Table 5. Nonresidential Building Fires and Losses Reported to NFIRS (2010–2012)

Year	Nonresidential Building Fires	Nonresidential Building Fire Deaths	Nonresidential Building Fire Injuries	Nonresidential Building Fire Dollar Loss (in millions)
2010	67,426	76	669	$1,636
2011	67,885	83	702	$1,856
2012	64,926	53	608	$1,859

Source: USFA, 2010-2012 NFIRS.

Table 6 shows the raw numbers of nonresidential structure fires and losses reported to NFIRS from 2010 to 2012. On average, about 89 percent of nonresidential structure fires, 91 percent of deaths, 89 percent of injuries and 93 percent of dollar loss reported to NFIRS from 2010 to 2012 occurred in nonresidential buildings.

Table 6. Nonresidential Structure Fires and Losses Reported to NFIRS (2010–2012)

Year	Nonresidential Structure Fires	Nonresidential Structure Fire Deaths	Nonresidential Structure Fire Injuries	Nonresidential Structure Fire Dollar Loss (in millions)
2010	77,790	84	783	$1,796
2011	78,323	94	810	$2,011
2012	69,611	54	634	$1,939

Source: USFA, 2010-2012 NFIRS.

National Estimates of Building Fires and Losses

Based on the raw numbers of building fires and structure fires reported to NFIRS along with the NFPA survey estimates of structure fires, USFA developed a methodology for computing national estimates of residential and nonresidential building fires and losses.[8] USFA uses these national building fire estimates in the Topical Fire Report Series, Fire Estimate Summary Series, and various other fire data reports.[9] Tables 7 and 8 present USFA's national estimates for residential and nonresidential building fires and losses, respectively.

[8] USFA's methodology for computing national estimates of residential and nonresidential building fires and losses is detailed in USFA's "National Estimates Methodology for Building Fires and Losses," August 2012, http://www.usfa.fema.gov/downloads/pdf/statistics/national_estimate_methodology.pdf.

[9] USFA's Fire Estimate Summary Series as well as 2003-2012 national estimates of residential and nonresidential building fires and losses are published at http://www.usfa.fema.gov/statistics/estimates/index.shtm. USFA's Topical Fire Report Series and various other fire data reports are available at http://www.usfa.fema.gov/statistics/.

Table 7. USFA's National Estimates of Residential Building Fires and Losses (2010–2012)

Year	Residential Building Fires	Residential Building Fire Deaths	Residential Building Fire Injuries	Residential Building Fire Dollar Loss — Adjusted to 2012 Dollars (in millions)
2010	362,100	2,555	13,275	$6,999
2011	364,500	2,450	13,900	$6,789
2012	374,000	2,385	13,050	$7,103

Source: USFA, 2010-2012 Fire Estimate Summary Series.

Table 8. USFA's National Estimates of Nonresidential Building Fires and Losses (2010–2012)

Year	Nonresidential Building Fires	Nonresidential Building Fire Deaths	Nonresidential Building Fire Injuries	Nonresidential Building Fire Dollar Loss — Adjusted to 2012 Dollars (in millions)
2010	84,900	80	1,375	$2,528
2011	85,400	80	1,100	$2,486
2012	92,800	65	1,450	$2,472

Source: USFA, 2010-2012 Fire Estimate Summary Series.

National Fire Incident Reporting System Data Used in U.S. Fire Administration Analyses

Although NFIRS contains hundreds of data elements, only a few are used in producing USFA's topical reports. Most of these elements are required to be completed for each fire incident type. For small, **confined** fires (i.e., Incident Types 113-118), outside rubbish fires with no value (Incident Types 150-155) and other unclassified fires, however, certain data elements are not required to be completed.

A complete list of NFIRS data elements is documented in the "National Fire Incident Reporting System Complete Reference Guide."[10] Table 9 identifies the NFIRS data elements that are used most often in fire data analyses in the topical reports produced by USFA.

[10] "NFIRS Complete Reference Guide," USFA, January 2013, http://www.nfirs.fema.gov/documentation/reference/.

Table 9. NFIRS Data Elements Used in USFA Analyses

Data Element	Description	Required Data Element for all Fires
Incident type	The actual situation found on-scene when emergency personnel arrived.	Yes
Property use	The actual use of the property where the incident occurred, not the overall use of mixed use properties of which the property is part.	Yes
Incident date	The month, day and year of incident.	Yes
Alarm time	The actual month, day, year and time of day (hour, minute and seconds) when the alarm was received by the fire department.	Yes
Death	A civilian fire death resulting from the incident or during the mitigation of the incident (includes emergency personnel who are not part of the fire department, such as police officers or utility workers).	Yes
Injury	A civilian fire injury resulting from the incident or during the mitigation of the incident (includes emergency personnel who are not part of the fire department, such as police officers or utility workers).	Yes
Dollar loss	The sum of the total property and contents dollar losses.	Yes
Fire spread[11]	The extent of fire spread in terms of how far the flame damage extended.	No
Area of fire origin	The primary use of the area where the fire started within the property.	No
Heat source	The source of heat that ignited the "item first ignited" to cause the fire.	No
Item first ignited	The use or configuration of the item or material first ignited by the heat source. The item that had sufficient volume or heat intensity to extend to uncontrolled or self-perpetuating fire.	No
Factors contributing to ignition	The contributing factors that allowed the heat source and combustible material to combine to ignite the fire.	No
Presence of detectors	The existence of fire detection equipment within its designed range of the fire.	No
Presence of automatic extinguishing system (AES)	The existence of an AES within the AES's designed range of a fire.	No

Source: "NFIRS Complete Reference Guide," USFA, January 2013.

In addition to the data elements presented in Table 9, "fire cause" is a data characteristic included in almost every USFA topical report analysis; however, it is not directly collected in NFIRS. It is determined for all structure fires based on an algorithm using cause-related data elements from NFIRS such as the heat source, item first ignited, cause of ignition, factors contributing to ignition, and equipment involved in ignition to name a few. The causes of fires are often a complex chain of events. To make it easier to grasp the "big picture," 16 mid-level categories of fire causes such as heating, cooking, and electrical malfunction are used by USFA to define structure fire causes.

Structure fires are assigned to one of the 16 mid-level cause groupings using a hierarchy of definitions. A fire is included in the highest category into which it fits on the list. If it does not fit the top category, then the second one is considered, and if not that one, the third, and so on. Once a match is found, the cause is assigned and no further checking of subsequent categories is done in the matrix. If no match is found, the incident is assigned a fire cause of "unknown."[12]

Unknown Data Entries and Missing Values

On a fraction of the incident reports or casualty reports submitted to NFIRS, the desired information for many data elements either is reported as "unknown" or is not reported at all. The total number of unknown entries or missing (i.e., blank or null) values is often larger than some of the important subcategories. For example, 46 percent of fatal fires in residential buildings reported from 2010-2012 do not have sufficient data recorded in NFIRS to determine fire cause. The lack of data, especially for these residential fatal fires, masks the true picture of the fire problem. Many prevention and public education

[11] Fire spread is not a required data element for all fires. Although not required for confined fires (i.e., Incident Types 113-118), the confined fire incident types were designed to reflect small, low loss fires, typically with a fire spread that is limited to the object of fire origin. In addition, fire spread is **only** a required element in the fire module when the structure type is coded as an enclosed building or fixed portable or mobile structure. Therefore, when analyzing NFIRS building fire data only, fire spread is either required or could be inferred for confined fires and essentially contains no missing data values.

[12] USFA's detailed "Structure Fire Cause Methodology" is available at www.usfa.fema.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm.

programs use NFIRS data to target at-risk groups or to address critical problems, fire officials use the data in decision making that affects the allocation of firefighting resources, and consumer groups and litigators use the data to assess product fire incidence. When the unknowns are large, the credibility of the data suffers. In some cases, even after the best attempts by fire investigators, the information is truly unknown. In other cases, the information reported as unknown in the initial NFIRS report is not updated after the fire investigation is completed. Fire departments need to be more aware of the effect of incomplete data reporting and the need to update the initial NFIRS report if additional information is available after investigation. Efforts have been undertaken at the national level to encourage fire departments to close the loop on fires after investigations are completed.

In analyses, the unknown and missing data values should not be ignored. The approach taken by USFA in presenting the data is to provide not only the "raw" percentages of each category, but also the "adjusted" percentages computed using only those incidents for which data were provided. This calculation, in effect, distributes the fires for which the data are unknown in the same proportion as the fires for which the data are known, which may or may not be approximately right. Both the reported data and the adjusted data (if unknowns are present) are plotted on bar charts in USFA reports.

The following example illustrates distributing the fires for which the data are unknown using the cause of residential building fires: Cooking was determined as the fire cause for 38.4 percent of reported residential building fires from 2010 to 2012; another 17.9 percent of reported fires had cause unknown. Thus, the percent of fires that had their cause reported was 100 minus 17.9 equals 82.1 percent. With the unknown causes proportioned like the known causes, the adjusted percent of cooking fires in residential buildings can then be computed as 38.4 divided by 82.1 equals 46.8 percent.

It is important to note that null and blank values are considered **unreported** data and differ in meaning and substance from "unknown" data. In data elements where information is required, a null or blank value may invalidate the record and cause it to be excluded from analyses. In addition, many fire data elements are not required for NFIRS confined fires (i.e., Incident Types 113-118) and, thus, contain missing or null values. Therefore, USFA excludes confined fires from the analyses of these nonrequired data elements for building fires.

The following section focuses on data elements where information is required for nonconfined fires (i.e., Incident Types 111 and 120-123); however, the data entries for these elements may contain valid "unknown" values. Tables 10 and 11 show the percentages of unknown data values for NFIRS data elements that are required for only nonconfined residential and nonresidential building fires (i.e., the percentages do not reflect confined fires) with the exception of "fire cause." Although USFA's fire cause, as previously discussed, is not a collected NFIRS data element per se but rather assigned based on an algorithm using cause-related data elements from NFIRS, it is included in these tables for ease of presentation. It is important to note that percentages of unknown data values for "fire cause," unlike the rest of the required data elements for nonconfined fires presented in the tables, reflect **both** confined and nonconfined fires.

Table 10. Percent of Unknown Values by Specific Data Element for Residential Building Fires Reported to NFIRS (2010–2012)

Data Element	2010 Percent Unknown	2011 Percent Unknown	2012 Percent Unknown
Area of fire origin	11.6	11.8	13.6
Heat source	34.4	34.7	39.2
Item first ignited	34.6	35.2	37.8
Factors contributing to ignition	25.5	26.0	28.4
Presence of detectors	29.8	30.2	30.5
Presence of AES	8.3	8.5	9.0
Fire cause	18.0	18.4	17.0

Source: NFIRS.

Note: For 2012, increases in the percent unknowns of heat source and factors contributing to ignition may be the result of an NFIRS edit change ("NFIRS Version 5.0 Design Documentation," January 2012, Relational Edit No. 181, Fire Module, Equipment Involved in Ignition, Page 108, https://www.nfirs.fema.gov/documentation/design/2012/NFIRS_5.0_Design_Documentation_1-2012.pdf).

Table 11. Percent of Unknown Values by Specific Data Element for Nonresidential Building Fires Reported to NFIRS (2010–2012)

Data Element	2010 Percent Unknown	2011 Percent Unknown	2012 Percent Unknown
Area of fire origin	16.5	16.6	18.9
Heat source	39.8	40.4	45.2
Item first ignited	40.8	41.6	43.9
Factors contributing to ignition	27.9	28.0	31.2
Presence of detectors	19.5	20.2	20.0
Presence of AES	9.6	9.9	10.5
Fire cause	38.0	37.0	35.9

Source: NFIRS.

Note: For 2012, increases in the percent unknowns of heat source and factors contributing to ignition may be the result of an NFIRS edit change ("NFIRS Version 5.0 Design Documentation," January 2012, Relational Edit No. 181, Fire Module, Equipment Involved in Ignition, Page 108, https://www.nfirs.fema.gov/documentation/design/2012/NFIRS_5.0_Design_Documentation_1-2012.pdf).

Incomplete Loss Reporting

As troublesome as the fact that insufficient data for the various NFIRS data elements can mask the true picture of the fire problem and impact the credibility of the data, equally challenging is the apparent nonreporting of injuries and property loss associated with many fire incidents. For example, there are many reported fires where the flame spread indicates damage but property loss is not reported. It is notoriously difficult to estimate dollar loss, but an approximation is more useful than leaving the data element blank. Analysts need to be aware that this apparent lack of loss data affects the understanding of those fires which cause substantial loss.

Identifying Large Outliers

If the incident record clearly contains outliers, it is generally recommended to exclude it from the analysis. Before excluding such records, however, it is suggested that a quick Internet search be conducted to see if some unusual fire did occur. Additionally, if time permits, following up with the fire department that submitted the incident record may be the best method to use for data verification.

National Fire Incident Reporting System Analytic Resources

Several resources are available that provide more detailed documentation on the NFIRS system and using the NFIRS data. The "National Fire Incident Reporting System Complete Reference Guide" provides both instructions for reporting data to NFIRS and an understanding of the data elements collected by the system. It also serves as a reference for the coding of the data.

The "National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues" discusses analytic considerations and methods of analyzing fire incident data using the NFIRS data. The topics include the NFIRS 5.0 data structure, general quality assurance issues, and definitions and parameters of common fire analyses (e.g., residential building fires or fires by a specific cause). The methods, techniques and considerations discussed are those used by USFA analysts and do not necessarily reflect methods, techniques and considerations used by fire data analysts from other agencies and organizations. NFIRS data partners may (and do) employ their own methods for analyzing the data and may make differing assumptions when encountering data issues.

The "National Estimates Approach to U.S. Fire Statistics" is the original methodology for creating estimates of the U.S. fire problem using the NFPA's annual Survey of Fire Departments for U.S. Fire Experience and the NFIRS data. The authors present a detailed consensus procedure for such calculations and the supporting rationale. "National Estimates Methodology for Building Fires and Losses" is the USFA's application of the national estimates approach to building fires and fire losses. It details USFA's current fire data estimation methodology for all building (i.e., residential and nonresidential) fires and associated losses.

The USFA's "Structure Fire Cause Methodology" provides a detailed description of the cause hierarchy methodology and the technical hierarchy itself. USFA's "Data Sources and Methodology Documentation" provides an in-depth discussion of the data sources and the methodologies used to incorporate these data into fire analyses. Lastly, the "Fire Data Analysis Handbook" is a resource for those unfamiliar with basic data analysis techniques and their applicability to fire data-based analyses.

Resource List

1) "National Fire Incident Reporting System Complete Reference Guide," USFA, January 2013, http://www.nfirs.fema.gov/documentation/reference/.
2) "National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues," USFA, July 2011, http://www.usfa.fema.gov/downloads/pdf/nfirs/nfirs_data_analysis_guidelines_issues.pdf.
3) Hall, J. and Harwood, B., "The National Estimates Approach to U.S. Fire Statistics," *Fire Technology*, Vol. 25, No. 2 (1989), 99-113, http://www.nfpa.org/~/media/6906FADB2CE149488FB5103F4A750A05.ashx.
4) "National Estimates Methodology for Building Fires and Losses," USFA, August 2012, http://www.usfa.fema.gov/downloads/pdf/statistics/national_estimate_methodology.pdf.
5) USFA's "Structure Fire Cause Methodology," http://www.usfa.fema.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm.
6) "Data Sources and Methodology Documentation," USFA, March 2014, http://www.usfa.fema.gov/downloads/pdf/statistics/data_sources_methodology.pdf.
7) "Fire Data Analysis Handbook," Second Edition, USFA, January 2004, http://www.usfa.fema.gov/downloads/pdf/publications/fa-266.pdf.