

# **NFPA 921 *Guide For Fire and Explosion Investigations*, 2004 Edition**

## **An Update**

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### **Introduction**

The membership of the National Fire Protection Association (NFPA) approved the current 2004 edition of NFPA 921 *Guide for Fire and Explosion Investigations* at the November 2003 Fall Conference. This is the fifth edition of the document developed by the Technical Committee on Fire Investigations over the past 12 years. The evolution of NFPA 921 has brought the application of fire science to the field of fire investigation and analysis and provided national consensus guidelines for fire investigators in the public and private sectors. The 2004 edition contains a new Chapter, *Analyzing the Incident for Cause and Responsibility* and key revisions to existing sections published in the 2001 edition. The following discussion presents an overview of the 2004 edition, including highlights of principal changes.

The 2004 document was expanded to 262 pages from the 229-page 2001 edition, and it now has 27 chapters, compared to 25 chapters in the previous edition. As is the case with any revised NFPA guide or standard, the revised text or new text is indicated by a line in the left hand

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margin, which aids in comparing revised sections to those in the previous edition. The 2004 edition has been reorganized to some extent, in part to comply with the NFPA Manual of Style. Referenced Publications appear in Chapter 2, Definitions in Chapter 3, and in addition to new Chapter 19, Chapters 11, *Legal Considerations* and Chapter 15, *Documentation of the Investigation* were rewritten. A cross-reference of the 2004 chapters compared to the 2001 edition is included at the end of this paper.

### **What is NFPA 921?**

NFPA 921 is a guide for the methodology of conducting fire and explosion investigations; it does not contain mandatory requirements which must be followed by investigators. Under the Regulations Governing Committee Projects, the NFPA defines a guide as: “A document that is advisory or informative in nature and that contains only nonmandatory provisions. A guide may contain mandatory statements such as when a guide can be used, but the document as a whole is not suitable for adoption into law.”

In Section 1.2.1, NFPA 921 states that, “The purpose of this document is to establish guidelines and recommendations for the safe and systematic investigation or analysis of fire and explosion incidents.... This document has been developed as a model for the advancement and practice of fire and explosion investigation, fire science, technology, and methodology.” Section 1.3.2 further states, “As every fire and explosion is in some way different and unique from any other, this document is not designed to encompass all of the necessary components of a complete investigation or analysis of any one case.” Not every portion of this document may be applicable to every fire or explosion incident. It is up to investigators (depending on their responsibility, as well as the purpose and scope of their investigation) to apply the appropriate recommended procedures in this guide to a particular incident.” The document is applicable to both fire and explosion incidents. It is also applicable to fire scene examinations and the fire analysis phase of investigations after the fire scene is no longer available.

As with any document developed through a consensus process by a technical committee, NFPA 921 is not perfect. For example, NFPA has already issued four errata items to the 2004 edition, some substantive and some editorial. The 1998 edition contained errors in certain electrical and fire-growth-related formulas, and errata were published by the NFPA.<sup>1</sup> Some topics contained in NFPA 921 may not be universally accepted by all investigators and may be subject to technical challenge. However, the document has become an important reference and tool among other fire engineering and investigative literature and practices to support the reliable determination of fire origin and cause for fire investigators and fire analysts.

### **Selected Topics**

**The Scientific Method.** In revised sections of Chapter 4, *Basic Methodology*, the Committee has affirmed that the scientific method is applicable to the field of fire investigation as a systematic approach in developing and proving origin and fire cause hypotheses. Chapter 4 provides guidance on the step-by-step process of the scientific method from defining the problem through the testing and selection of a hypothesis. An investigator does not need to be a fire scientist; however, NFPA 921 does provide a recommended, systematic method for selecting, testing and accepting, or discarding possible fire origin and cause determinations. Further, when testing a hypothesis, an investigator does not necessarily need to utilize experimental tests to arrive at a conclusion. A hypothesis may be supported by cognitive reason based on logic and generally accepted principles of fire behavior. Specifically, Section 4.3.6 states that in the testing of a hypothesis by deductive reasoning, “The testing of the hypothesis may be either cognitive or experimental.”

**Process of (Fire Cause) Elimination.** Text in Section 18.2, Process of Elimination, recognizes that in a certain fire scene with a well-defined area of origin (after determining the area of origin

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<sup>1</sup> To view the errata and Tentative Interim Amendments (TIAs) on current NFPA documents, go to NFPA’s website, [www.nfpa.org](http://www.nfpa.org). Select “Codes and Standards”. Errata on previous editions not available on the website may be obtained from the NFPA Library.

first), it may be possible to make a fire cause determination without having physical evidence of that cause. An example could be the selection of an open flame as the heat of ignition even if the evidence of an open flame device is not found. However, for the conclusion to be credible, the analysis should follow the scientific method steps covered in Chapter 4 to eliminate other causes. Section 18.2.5 also states that the elimination of all accidental causes to arrive at a conclusion that a fire was incendiary may be justified in limited situations where there is a “clearly defined” area of origin and other possible ignition sources can be examined and eliminated. Such a determination becomes more difficult if there has been heavy fire damage to the area or room of interest. (Also see revised text in Section 19.2.1.3 Incendiary Fire Cause for the classification of fire cause as undetermined if a person’s intent cannot be determined.)

**Spoliation of Evidence.** Another topic has been a concern for spoliation of evidence at the scene or later during activities such as equipment examinations. The 2004 edition of NFPA 921 defines spoliation in Section 11.3.5 as, “Spoliation of evidence refers to the loss, destruction or material alteration of an object or document, that is evidence or potential evidence in a legal proceeding by one who has the responsibility for its preservation.” It also states that spoliation of evidence may occur when movement of evidence or alteration of the scene significantly impairs the ability of other interested parties to obtain evidentiary value of evidence compared to the initial investigator.

NFPA 921 provides guidance for investigators to help understand the issues and avoid spoliation including:

- Investigations should be conducted in ways that minimize the loss or destruction of evidence.
- Before a scene is altered, the scene should be photographed and documented and relevant evidence preserved.

- The responsibility to notify other parties may vary among public and private sectors.
- The photographing and documentation of key evidence relevant to an investigator's opinion and evidence of alternative hypotheses that are considered and ruled out as well.
- Given the nature of fire scene examination work, which requires the movement of evidence or alteration of the scene, such scene examination activity should not be considered spoliation.
- It also may be necessary to remove items of evidence from the scene to protect it from further damage. Such activity to protect evidence should not be considered spoliation.

Section 11.3.5.6 also references several relevant ASTM forensic standards addressing the collection, preservation, and examination of evidence. Chapter 16, *Physical Evidence* provides specific guidance on methods of evidence collection, identification, transportation and testing of evidence.

## **Revisions of Interest**

### **Opinions**

Revisions to Chapter 18, *Fire Cause Determination* include new text on the levels of certainty for opinions formed from the analysis of incidents by investigators. The two levels of certainty outlined in Section 18.6 are as follows:

“Probable. This level of certainty corresponds to being more likely true than not. At this level of certainty, the likelihood of the hypothesis being true is greater than 50 percent.”

“Possible. At this level of certainty, the hypothesis can be demonstrated to be feasible but cannot be declared probable. If two or more hypotheses are equally likely, then the level of certainty must be “possible.”

As in the previous edition, NFPA 921 adds that the fire cause should be listed as undetermined if the level of certainty of the opinion is only possible or suspected. Further, only when the level of certainty is probable, can a fire cause be determined to be accidental, incendiary, or natural.

### **Redefining “Cause” Versus “Fire Cause”**

In keeping with the development of the development of new Chapter 19, *Analyzing the Incident for Cause and Responsibility*, the committee has re-defined the term “cause” in Chapter 3 to be a much broader term beyond the traditional concept of the elements which resulted in the cause of the fire.

3.3.22 Cause. “The circumstances, conditions, or agencies that brought about or resulted in the fire or explosion incident, damage to property resulting from the fire or explosion incident, or bodily injury or loss of life resulting from the fire or explosion incident.”

The term relating to the cause of the fire contained in the 2001 edition has been designated Fire Cause and the definition remains unchanged as follows:

3.3.54 Fire Cause. “The circumstances, conditions, or agencies that bring together a fuel, ignition source, and oxidizer (such as air or oxygen) resulting in a fire or a combustion explosion.

An example of the difference among these terms would be a fire loss in a commercial property. A failure analysis determined that the cause of fire spread and resulting damage was a closed water supply valve in an automatic sprinkler system allowing the fire to develop unchecked in the room of origin and spread through the building. While the fire investigation determined that

the cause of the fire was the ignition of combustible trash in the room of fire origin by the placement of a portable space heater too close to the combustible trash.

### **New Chapter 19, *Analyzing the Incident for Cause and Responsibility***

This new chapter addresses a broader goal of an investigation to reach conclusions about the significant factors of a fire or explosion incident that contributed to death, injury, or damage. Section 19.3.2 lists the conditions affecting fire damage, and Section 19.4.1 lists considerations in establishing the fire cause of deaths and injuries. Section 19.5 Determining Responsibility addresses the accountability of the person or entity for the event which resulted in the fire, death, injury or property damage. Section 19.2.1 Classification of the Cause contains text from the previous edition for the classification of the cause of fires as accidental, natural, incendiary, undetermined.

### **Other Revised Chapters**

Chapter 11, *Legal Considerations* was rewritten and includes new text on legal proceedings, rules of evidence, and the admissibility of expert testimony. Chapter 15, *Documentation of the Investigation* was also revised and is worth checking out.

### **The NFPA Standards Making Process**

NFPA 921 is developed and revised by the NFPA Technical Committee on Fire Investigations through a national consensus standards process. The NFPA follows guidelines of the American National Standards Institute to maintain a balance of committee members among the interested parties including the fire service, private engineering and investigative interests, the legal community, testing laboratories, and the insurance industry. Anyone with an interest in the development of NFPA 921 can participate in the process by submitting proposals or comments using a form included in the document.

Work is beginning on a revised NFPA 921 to be published in 2008. Initially, the NFPA will issue a call for proposals for revisions to the document.<sup>2</sup> Then the committee will meet to review, consider and act on the proposals and issue a Report on Proposals (ROP). This document includes the public proposals, committee actions, and substantiation for those actions. The ROP is then subject to public review and comment. Interested parties may forward comments on the ROP to the NFPA. These comments are reviewed and acted upon by the committee. The public comments, together with the committee action on each comment, are published in the Report on Comments (ROC). Prior to publication of both the ROP and ROC, the committee's actions must be approved by a simple majority vote of the committee members by letter ballot. These published committee reports, which together represent the proposed text revisions, are then submitted for open debate and adoption by the Association membership at either the NFPA's spring or fall conference. The Association may either adopt a report as published, adopt a report as amended - subject to approval by the committee, return a report to the committee, or return a portion of the report to the committee. Following adoption by the membership, the new or revised document is published once it is issued by the NFPA Standards Council.

### **How to Obtain a Copy of NFPA 921**

The current 2004 edition of NFPA 921 is available from NFPA by calling 1-800-344-3555.

### **References**

1. Sanderson, Jack L., 2004 Edition of NFPA 921 Arrives With Important Changes, *Fire Findings*, Summer 2004, Vol.12, No.3

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<sup>2</sup> The NFPA Form For Proposals on NFPA Technical Committee Documents may be downloaded from the NFPA website.

2. Hewitt, T-D, On the Hot Seat, *NFPA Journal*, January/February 2000.
3. Pavlisin, M and Horan, S, Are Origin-and -Cause Investigators Fire Scientists, *Fire Engineering*, June 1999.
4. Icové, David J., DeHaan, John D., Chapter 1 Principles of Reconstruction, Forensic Fire Scene Reconstruction, Person Prentice Hall, 2004
5. Churchward, Daniel L., NFPA 921 Update: Preparation for 2007 Edition Starting, *Fire Findings*, Spring 2004, Vol.12, No.2
6. Regulations Governing Committee Projects, NFPA Directory, 2004.

**NFPA 921 Chapter Reorganization**

| <b>Chapter</b>              | <b>2004 Edition</b> | <b>2001 Edition</b> |
|-----------------------------|---------------------|---------------------|
| Administration              | 1                   | 1                   |
| Referenced Publications     | 2                   | 25                  |
| Definitions                 | 3                   | 1                   |
| Basic Methodology           | 4                   | 2                   |
| Basic Fire Science          | 5                   | 3                   |
| Fire Patterns               | 6                   | 4                   |
| Building Systems            | 7                   | 5                   |
| Electricity and Fire        | 8                   | 6                   |
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| Fire-Related Human Behavior | 10                  | 8                   |
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