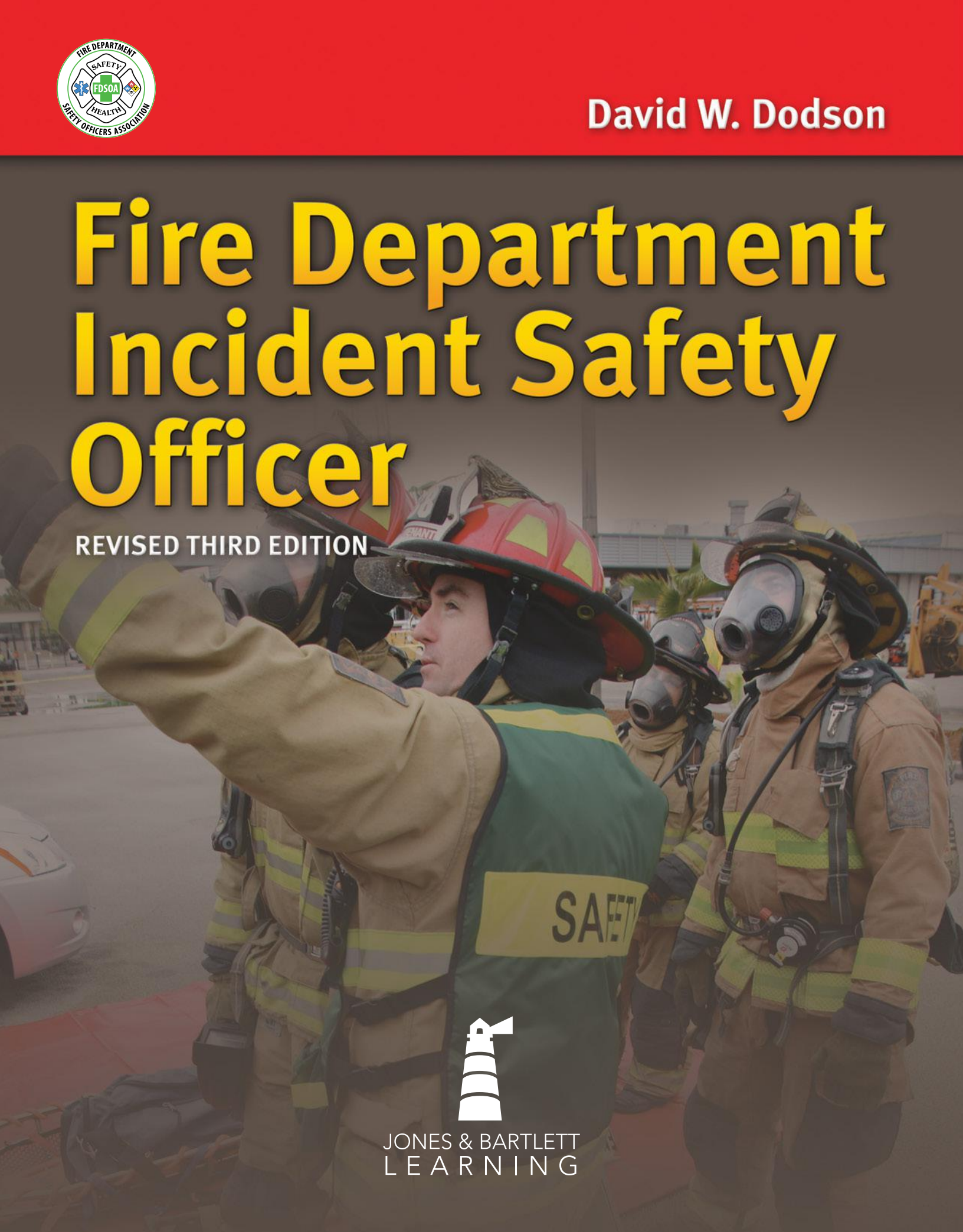

FIRE DEPARTMENT
SAFETY
FDSOA
HEALTH
SAFETY OFFICERS ASSOCIATION
David W. Dodson
Fire Department Incident Safety Officer
REVISED THIRD EDITION
SAFETY
JONES & BARTLETT
LEARNING

Jones & Bartlett Learning
World Headquarters
5 Wall Street
Burlington, MA 01803
978-443-5000
info@jblearning.com
www.jblearning.com
www.psglearning.com

Jones & Bartlett Learning books and products are available through most bookstores and online booksellers. To contact the Jones & Bartlett Learning Public Safety Group directly, call 800-832-0034, fax 978-443-8000, or visit our website, www.psglearning.com.

Substantial discounts on bulk quantities of Jones & Bartlett Learning publications are available to corporations, professional associations, and other qualified organizations. For details and specific discount information, contact the special sales department at Jones & Bartlett Learning via the above contact information or send an email to specialsales@jblearning.com.

20510-7

Production Credits
General Manager and Executive Publisher: Kimberly Brophy
VP, Product Development: Christine Emerton
Senior Managing Editor: Donna Gridley
VP, Sales, Public Safety Group: Phil Charland
Executive Editor: Bill Larkin
Senior Development Editor: Janet Morris
Editorial Assistant: Alexander Belloli
Project Specialist: Meghan McDonagh
Senior Marketing Manager: Brian Rooney
Product Fulfillment Manager: Wendy Kilborn
Composition: S4Carlisle Publishing Services
Cover Design: Kristin E. Parker
Rights & Media Research Assistant: Robert Boder
Media Development Editor: Shannon Sheehan
Cover Image: Courtesy of David Dodson
Printing and Binding: LSC Communications
Cover Printing: LSC Communications
Unless otherwise noted, all interior photographs courtesy of David Dodson.

To order this product, use ISBN: 978-1-284-21655-4

The Library of Congress has cataloged the first printing as follows:
Dodson, David W.
Fire department incident safety officer / David W. Dodson. -- Third edition.
pages cm
Includes index.
ISBN 978-1-284-04195-8
1. Fire extinction--Safety measures. 2. Fire fighters. 3. Safety engineers. I. Title.
TH9182.D63 2015
628.9′250289--dc23
2015017515

6048

Printed in the United States of America
24 23 22 21 20 10 9 8 7 6 5 4 3 2 1

Dedication

This book is for the individual who works while others sleep; whose body is coated in soot and sweat; who pledges to help those imperiled; who resolves to improve with each experience; who leverages knowledge to gain an edge; who strives for intellectual growth; who values team effort and honors the sacrifices of those who have gone before; and who is selflessly willing to risk death for the triumph of life.

These collective attributes will ultimately make a difference in the fire service. Therefore, I dedicate this book to that individual who tirelessly protects us all: *the firefighter*.

Brief Contents

Contents

About the Author

Dave Dodson

Chief Dodson is a 41-year fire service veteran, with 25 of those years as a responder. He began his fire service career with the U.S. Air Force, after which he spent almost 7 years as a fire officer and training/safety officer for the Parker Fire District in Parker, Colorado (now South Metro Fire Rescue Authority). He became the first career training officer for Loveland Fire and Rescue (CO), serving in many functions, including engine officer, hazmat technician, duty safety officer, and emergency manager for the city. He was a shift battalion chief for the Eagle River Fire District in Colorado before starting his current company, Response Solutions, which is dedicated to teaching firefighter safety and practical incident handling. He has presented more than 900 classes to 80,000 firefighters across the United States and Canada.

Chief Dodson authored the first two editions of this book as well as Fire Engineering's three-volume DVD training series, *The Art of Reading Smoke*. In 2014, he teamed with Battalion Chief John Mittendorf (Los Angeles Fire) to coauthor *The Art of Reading Buildings* (PennWell Corporation).

Chief Dodson has served as Chairman of the NFPA 1521 Task Group (Fire Department Safety Officer) and currently serves as a member of NFPA's Fire Service Occupational Safety and Health Technical Committee.

Chief Dodson continues to assist the National Institute for Occupational Safety and Health (NIOSH) as a subject matter expert for the review of Line of Duty Death technical investigative reports. Likewise, he has assisted several law firms as a topic expert in matters concerning firefighter safety. He is also a past president of the Fire Department Safety Officers Association. In 1997, the International Society of Fire Service Instructors honored Chief Dodson as the George D. Post Fire Instructor of the Year. In 2017, he was honored as the recipient of the first-ever "Lifetime Achievement Award" by the Fire Department Safety Officers Association.

Acknowledgments

Writing a book such as this can never be a solo project, and I wish I had the memory cells to acknowledge everyone who planted a seed, offered insights and suggestions, or made a willing contribution. I will probably forget someone, but I want to list and offer a colossal thank-you to those who opened a door, provided mentoring, or challenged me to raise the bar.

The Fire Department Safety Officers Association (FDSOA) adopted the first and second editions of this book as the primary study reference for their National Fire Service Professional Qualifications Board Certification for the Incident Safety Officer—Fire Suppression position. Thank you to the elected FDSOA board members, membership, and certification candidates for your continued support. Also a special thanks to Rich Marinucci and Linda Stone, whose efforts have helped reenergize the FDSOA. Your commitment, support, and friendship are deeply appreciated.

To those who have left distinct fingerprints on this manuscript, I owe more than a thank you:

- The late David Ross (Chief of Safety, Toronto Fire Services, Canada)
- Chief David C. Comstock (Western Reserve Joint Fire District, OH)
- The late Chief Alan Brunacini (Phoenix Fire)
- Chief Billy Goldfeder (Loveland-Simms, Ohio)
- Chief Bobby Halton (editor, *Fire Engineering* magazine)
- Battalion Chief John Mittendorf (retired, Los Angeles Fire)
- Chief Sam Phillips (retired, Clallam County Fire District 2, WA)
- Deputy Chief Bill Shouldis (retired, Philadelphia Fire, PA)

Thanks also to those outstanding fire officers and associates who continually support my efforts and are always willing to answer any of my silly questions or help me with an issue or project: Brian Kazmierzak, Dan Madrzykowski, Steve Kerber, Mike West, Mike Gagliano, Phil Jose, Bruce Clark, Ric Jorge, Rick Davis, Murrey Loflin, and Greg Ward.

Fire Chief Forest Reeder (Tinley Park, IL) became a co-conspirator for many of the updates in this book—we spent many hours brain-storming at pubs all over North America. In addition to writing the chapter-opening case studies, Forest assisted with NFPA JPR interpretations and NIOSH technical report research. Thanks, Brother!

The project team at Jones & Bartlett Learning helped take this text to a new level! I am grateful for the efforts of Kim Brophy, Janet Maker, Janet Morris, and the design team for creating an attractive and user-friendly resource. Thank you also goes to those individuals and fire departments that helped with photographic contributions: Keith Muratori, Kim Fitzsimmons, Corey Kneedler, James Grimmett, Justin King, Loveland Fire & Rescue Authority (CO), Fort Lauderdale Fire (FL), New Orleans Fire (LA), Frisco Fire (TX), Clallam County Fire District 2 (WA), and the Superstition Fire & Medical District (AZ). Additional thanks to the contributors and review team.

My personal support system helps me navigate travel and business needs and keeps me driving forward. Thanks to Becky Stafford, Donna Davis, Carol Lanza, and Karen Boor. Finally, and most importantly, I would like to thank my loving family. My daughter, Kelsie, and son, Dan, are intelligent and energetic young adults who make my life a joy. My best friend and the mother of our children, LaRae, is an inspiration with her unwavering love and ever-positive spirit.

Contributors

Anthony Kastros
Battalion Chief (ret.)
Sacramento Metro Fire District
Sacramento, California

Stephen Raynis
Chief of the Bureau of Training (ret.)
Fire Department, City of New York
Brooklyn, New York

Shadd A. Whitehead
Fire Chief (ret.)
Livonia Fire and Rescue
Livonia, Michigan

Reviewers

Patrick Beckley
Fire Training Officer 2
Ohio Fire Academy
Reynoldsburg, Ohio

Rick Best
Eastern Advocate Manager, National Fallen Firefighters Foundation
Pataskala, Ohio

David L. Bullins
Department Chair, Fire Protection Technology and Emergency Management
Guilford Technical Community College
Jamestown, North Carolina

Craig Dart, B.A. CMM III
Division Chief, Quality Management and Accreditation
Toronto Fire Services
Toronto, Ontario

Jennifer Henson
Director, Fire Protection Technology and Firefighter Certification
Catawba Valley Community College
Hickory, North Carolina

Matthew Hull
Lieutenant/Training Officer
Athens Fire Department
Athens, Ohio

Richard A. Marinucci
Executive Director
Fire Department Safety Officers Association
Ann Arbor, Michigan

Gary D. Peaton
Industrial Program Coordinator
South Carolina Fire Academy
Columbia, South Carolina

Michael Petroff
Past Chair of the Board
Fire Department Safety Officers Association
Ann Arbor, Michigan

Sam Phillips, MS, EFO
Fire Chief (ret.)
Clallam County Fire District No. 2
Port Angeles, Washington

William Shouldis
Deputy Chief
Philadelphia Fire Department (ret.)
Philadelphia, Pennsylvania

Todd Van Roo
Incident Safety Officer/Instructor
Milwaukee Fire Department/Milwaukee Area Technical College
Milwaukee, Wisconsin

Richard Vober
Captain
Akron Fire Department Training Academy
Akron, Ohio

Al Wickline
Adjunct Instructor, Fire Science
Community College of Allegheny County (Boyce Campus)
Monroeville, Pennsylvania

James M. Zeeb
Captain/Paramedic
Kansas City Kansas Fire Department
Kansas City, Kansas

Preface

The Journey to *Making a Difference*

The purpose of this third edition remains the same as it was in the first two editions: to make a difference! With all the efforts and improvements invested in protective equipment, incident management systems, technology, training, and standards, we still have not met our consensus goal of reducing firefighter injuries and deaths by half, although we are finally starting to see some progress in certain areas.

In the first edition, I predicted that a well-trained and experienced ISO could reduce at least half the anticipated deaths and injuries. I further expressed that a dedicated and trained ISO is the quickest, cheapest, and simplest solution to improve on-scene firefighter safety. I was probably overoptimistic, but I remain convinced that a trained and experienced ISO can make a difference. In this book, therefore, I am revising the phrase "trained and experienced" to read "trained, experienced, and persuasive." We need to step up the effort if we are to realize our goal.

Since the first edition (1998), I have had the pleasure of watching the role of the ISO mature. Of particular note, the Fire Department Safety Officers Association (FDSOA) realized the goal of creating and implementing an accredited National Incident Safety Officer Certification. The FDSOA should be very proud of this program, and those who have invested the energy to become certified should be equally proud. I have seen hundreds of fire departments implement comprehensive ISO programs, and I have received hundreds (if not thousands) of emails describing how an ISO recognized and prevented a sure injury or death. It is interesting that we as a profession don't track statistics on firefighter injury or death "saves" by an ISO. Perhaps it's too speculative, too subjective, or it could be that we are humbled by just doing our job. Regardless, the ISO does—and can continue to—make a big difference.

With the thousands of trained ISOs on the job, why have overall death and injury statistics not been reduced by half? The answers are unclear, but I may have some of them. Recent research tells us that residential and commercial structure fires have changed: They have never been as hot, as fast, or as explosive as they are now. The building that we fight fires in is continually changing. Lightweight-constructed buildings will sucker punch the firefighter who approaches them with the same comfort as in the 1980s and 1990s. Further, we are responding to more incidents and to a greater variety of incidents. Finally, I believe that some of the basic curriculum we use to train and certify firefighters is deeply rooted in the past and has not evolved to reflect the changes that society has brought to the typical building fire. If the fires have changed, the building has changed, and the number and types of incidents have changed—yet our training *hasn't* changed—then it stands to reason that the ISO must change if we are to meet our death and injury reduction goals.

To be more persuasive (and realistic) as a safety officer requires more front-loading. So, for this edition, we have expanded the "front-loading" section to include up-to-date technical data that the fire service has gleaned from the outstanding fire research conducted by the National Institute of Standards, Underwriters Laboratories, and several fire departments. Additionally, we updated and expanded each chapter to reflect current best practices and evolving trends and concerns.

Some may appreciate that the ISO Action Model that Terry Vavra and I developed in the early 1990s is being retired. In its place, we offer a function/outcome model that more closely represents the expectations we should have of an ISO.

In some places, you'll notice that the ISO abbreviation for the incident safety officer has been altered to the simple SO or SOF. NFPA is taking steps to delete the "I" from ISO in favor of the the NIMS-compliant SO for Safety Officer. That is already reflective in NFPA 1561 - 2020 edition. In future editions of 1521, the same change will be made. National Incident Management Teams use the abbreviation SOF for the Safety Officer.

How to Use This Book

The book has been written in a stair-step, knowledge- and skill-building manner. First-time readers are encouraged to read chapters in order, as they build upon each other. As a desk reference for repeat readers, the book is divided into three sections:

- **Section 1** offers an introduction to the incident safety officer (ISO) role as a way to start preparing for the assignment. General safety concepts, guiding documents, and effective system components are discussed.
- **Section 2** is perhaps the most important one, providing in-depth "front-loading" information to help the ISO gain knowledge and skills. Of particular note, an entire chapter is devoted to reading smoke and another to reading buildings. These two areas—more than any—can help the ISO predict hostile events that can trap firefighters.

- **Section 3** applies the information in Section 2 to actual incidents. A basic approach to ISO duties is offered, as well as specific considerations for unique incidents, such as those involving hazardous materials or the wildland–urban interface. Section 3 ends with an overview of the often-forgotten ISO postincident responsibilities and includes a new chapter on the ISO's role at fire training activities (and planned, nonemergency events).

New to This Edition

Previous editions of this book have triggered an avalanche of appreciated criticism, corrections, and ideas that have been incorporated into this edition. Additionally, I have had a 15-year opportunity to meet with hundreds of colleagues while traveling and teaching ISO and Reading Smoke classes all over the country. For this revised third edition, I have gathered suggestions from hundreds of working safety officers, incident commanders, and suppression fire officers to improve this text and broaden its application. Each chapter has been critically updated and expanded. Other highlights include:

- A new chapter dedicated to the use of ISOs at training activities and planned, nonemergency events
- Content and formatting changes to help align to the new NFPA 1521, *Standard for Fire Department Safety Officer Professional Qualifications* (2020 edition), which is written using job performance requirement (JPR) language
- A revision and update for firefighter rehabilitation strategies
- Updated material that reflects a more complete understanding of the issues and concerns associated with newer and alternative building construction methods, including the "green" construction trend and renewable/alternative electrical power sources
- Specific ISO concerns associated with fire suppression staffing, deployment, and NFPA 1710/1720 criteria
- Results from recent fire behavior research projects, conducted by the National Institute of Standards and Technology and Underwriters Laboratories, with discussion of how this information can be used to help the ISO better protect firefighters
- New mnemonic tools to help readers remember key functions and to assist with certification study and assessments
- Attention to National Incident Management System (NIMS) compliance and processes for the expansion of the ISO role at major fires and disaster incidents, including an overview of safety officer responsibilities for incident management teams at NIMS Type 1 and Type 2 incidents
- New information on structural fire, on-scene contamination reduction processes to help with cancer prevention.

Suggestions Encouraged

As author, I take full responsibility for any misinterpretations of the suggestions and ideas that so many have graciously offered. I encourage you to be critical in your use of this edition—envision its application, apply the knowledge and skills, and provide suggestions and comments so that the fourth edition will be an even better tool for preventing firefighter injuries and deaths. *Make it safe out there!*

—David W. Dodson, Thornton, Colorado, Winter 2019/2020
Email: davedodson@q.com

SECTION

1

Preparing the Incident Safety Officer

This text is divided into three sections. Sections 2 and 3 are "street" oriented, with a strong focus on practical knowledge and skill-building. This first section focuses on safety concepts and the guiding standards behind the role of incident safety officer (ISO). One might understand why a fledgling fire officer would want to skip this section, but doing so would be a mistake. Section 1 provides a core foundation for anyone who wishes to make a difference as an ISO. The goal of any ISO is to prevent injuries and death, and the path to prevention starts with an understanding of the ISO's role. The first chapter, *The Safety Officer Role*, examines the ISO role through an exploration of the history of safety officers, a description of their responsibilities, and an overview of how firefighter deaths and injuries are occurring at incidents. The chapter *Safety Concepts* introduces us to the deep roots and concepts of any safety program, while the chapter *Guiding Laws, Regulations, and Standards* focuses on initiatives and publications specific to the fire service that have been developed to address injury and death issues.

Finally, the chapter *Designing an Incident Safety Officer System* recognizes that the fire service is quite diverse in the way resources are used (e.g., large or small; volunteer, combination, or paid; rural, suburban, or urban) and offers suggestions on how to develop an effective ISO program. Your study investment in Section 1 will pay dividends not only while on the fireground but throughout your career as you tackle firefighter safety issues as an ISO or in any other position with safety accountability.

Voices of Experience

I completed the Fire Department Safety Officers Association's ISO program, along with the Reading Smoke program that was held in Grand Rapids, Michigan, after taking the reins as training coordinator for our department. The assignment of Incident Safety Officer, as is typical with most departments, was filled on an as-needed basis by the incident commander (IC) and was driven by incident needs. My experience over several years as the lead trainer for our department had helped me begin to see things differently in terms of on-scene operational processes, both strategically and tactically. I was developing an awareness of better

practices as I attended the ISO and Reading Smoke classes that challenged the way I had previously viewed how we worked in the hazard zone.

The ensuing changes in our department became contentious, as prior beliefs passed on from credible and skilled senior firefighters and officers were being challenged by science and new knowledge of the enemy. Once I embraced my new awareness and began to dig deeper into new techniques, it was as if I had put on a new pair of glasses and could now see things that I wasn't skilled enough to see before. This became painfully evident during an incident that forever changed how I viewed the role of Safety Officer.

The incident occurred on an average spring weekday, in a typical suburban family residence in a subdivision. The tones dropped for a smoke investigation at an occupied single-family residence shortly after 1530 hours on a Wednesday. I, like everyone on duty, quickly ran through the location in my head, analyzing the type of construction for homes found in this early 1990s subdivision. This neighborhood, like many others in our community, comprises well-kept ranch and two-story colonial dwellings, ranging in size from 1,600 to 2,800 square feet (150 to 260 m^2). I was just returning from the training grounds where I was prepping for extrication training that would be taking place the following day. I listened as the first-arriving engine made the scene and gave a quick size-up: "Engine 3 on the scene of a two-story residence, nothing showing, and with people standing in the driveway. We'll be investigating. This will be Stamford Command." It was the same initial transmission that is heard every day in our department. Shortly after this message, command followed with, "We have smoke inside the residence. Checking for the source"—another routine radio transmission. As additional apparatus arrived on scene, the next transmission is what caused me to point my vehicle in that direction: "Command to dispatch, we have heavy smoke now developing on the first and second floors." Command requested the next-due engine to stretch a supply to the first Engine 3, as the IC directed his crew to deploy a 1¾-inch preconnect interior and search for the fire. I could tell by the amount of radio traffic and heightened voices that conditions were rapidly changing. Still, there was no confirmation as to where the seat of the fire was located. The battalion chief arrived on scene, was updated by the IC, and assumed command.

As I turned into the subdivision, the fire's location became obvious. The smoke plume acted as a big arrow pointing downward to its origin. I parked well back from the apparatus-lined street. I donned my gear and began to walk up the block, passing the crowd of neighbors who had gathered. I began to size up the scene as I approached. Moderate-volume, nonpressurized smoke could be seen exiting multiple first- and second-story windows that had been manually opened on the Alpha and Delta sides. What was even more concerning was the visible nonpressurized smoke coming from the gable vents. I approached the IC and listened while he communicated with interior crews that were operating on both the first and second floors, still searching for the origin. The interior three-man crew on the first floor was reporting rapidly decreasing visibility, but little heat. What I had seen and heard thus far pointed toward a fire that was compartmentalized or in a concealed space—a fire that by now was probably well advanced. It was easy to discern that crews operating in the interior, as well as command, were becoming more anxious with each passing minute.

I was assigned as Safety Officer and asked if a 360 had been completed and if utilities were secured. I was informed that the initial 360 was completed and that utilities had not been secured. I advised that I would perform another 360 and get a visual on utilities and handle the gas meter if not secured. As I left to begin my 360, the IC directed the first-floor interior crew, armed with a 1¾-inch line, to check the basement. Within seconds the interior crew radioed that they had located the basement stairwell and upon opening the door were met by heat and dark smoke. Their next transmission relayed that they were in heavy heat and zero-visibility conditions as they descended into the basement. I reached the Bravo side and secured the gas meter. I then radioed command that a crew needed to secure the electric meter located on the Bravo–Charlie corner. When I turned the next corner to the Charlie side, my eyes grew big, seeing heavy black turbulent smoke pushing out from under the rear patio deck

Voices of Experience (continued)

below the kitchen window. I immediately radioed command with priority traffic that there was heavy fire in the basement, directly beneath the kitchen area. This information was relayed back to the interior crew that had just made its way down the basement stairs.

I met back up with command after completing my 360 and realized that the IC had poor situational awareness up to this point and that he wasn't amending his initial action plan to meet the rapidly changing conditions. My concern now was the crew operating in the most dangerous place they could be—the basement. After restating the conditions that I had just witnessed on the Charlie side, it was evident that the IC had what I call "focal lock" and couldn't see the obviously changing conditions. The next transmission from the interior basement crew was that they could not find the room of origin and that heavy heat and zero visibility were hampering their search. They requested that a thermal imaging camera (TIC) be brought to the basement. I recommended to command that he pull out the interior basement crew because conditions were rapidly deteriorating and there was still no water on the seat of the fire, stating that we should change to a defensive strategy based on a now well-advanced basement fire. His response: "I'm going to give them just a few more minutes." That's when I knew that he had completely lost his baseline for what was occurring.

I had been on scene for approximately 10 minutes and felt like we were no longer in control of the situation. As I was working my way back to evaluate the Charlie side again, I noticed the hose line running into the interior front door was caught on some landscape and the crewmember on the front porch was having difficulty feeding hose through the front door. While assisting in untangling the hose line, I got a sudden feeling that something bad was about to happen as the smoke that was pushing out the front door suddenly became much darker and increased in volume. I radioed to command with priority traffic that I believed we now had fire on the first floor and to order an emergency evacuation of all interior crews. As the order to evacuate was given, my eyes were glued to the front door to count helmets as they exited. I began to hear the crew communicating to each other as they worked their way from the top of the basement stairs to the common hallway, following the hose line toward the front door. Just as the crew made the hallway, only feet from their exit, I heard a large crunch and thud come from within, immediately followed by a huge push of dense smoke and heat out the front door and bay windows. The kitchen had just collapsed into the basement. Within seconds the assigned basement crew safely scrambled out the front door, collapsing on the front lawn as they looked back to see flames now lapping out the top of the front door. I have never been more thankful to see crews on the outside of a structure.

After a short defensive operation, the fire was brought under control and the visible evidence inside the smoking shell of the collapse area made me realize just how close we had come to potentially the worst day in our department's history. This fire and the corresponding scene management represented a defining moment for me. Wearing my "new glasses," I was able to see things that day in a totally different light, and I will never again enter a scene without those glasses on.

The good part of the story, beyond the fact that everyone went home, was the changes that took place after that incident. We revisited and revised many outdated operating guidelines and created new guidelines on TIC use with crews assigned to interior operations. TICs became mandatory on every frontline piece of apparatus, as did in-depth training on TIC use and limitations. Most importantly, the incident prompted the building and teaching of "situational awareness" skills in every training opportunity, no matter how simple or complex that training may be, continually working to move our firefighters away from being task-driven linear thinkers to being multidimensional thinkers who can analyze and predict outcomes. The ISO training proved to be only the beginning for me, and it was certainly the catalyst toward understanding and seeing an incident in a much different way.

Shadd A. Whitehead
Fire Chief (ret.), Livonia Fire and Rescue
Livonia, Michigan

The Safety Officer Role

CHAPTER

1

Knowledge Objectives

Upon completion of this chapter, you should be able to:

- Discuss the history of the fire department safety officer. (pp 7–8)
- List the National Fire Protection Association (NFPA) standards that pertain to the incident safety officer. (p 9)
- Cite current trends in firefighter injuries and fatalities. (pp 8–11)
- Describe the relationship between empirical and image factors and the need for an incident safety officer. (pp 9–12)
- Define the roles of an incident safety officer at planned and unplanned events. (NFPA 5.2.1 , p 12)

Skills Objectives

There are no ISO skills objectives for this chapter.

You Are the Incident Safety Officer

Your department has received notice from the city risk management division of a recent audit of fire department operations, after a significant fire ground injury determined that a gap exists in fire ground occupational health and safety practices. A review of standard operating procedures found that no clear designation of or means of accounting for an incident safety officer (ISO) exists. Past practice has delegated these functions to the incident commander and company officers. The Chief of Department has asked you to begin the process of developing a response-capable ISO position to be available on a 24-hour basis.

1. What standards and established fire service practices can you use in researching and identifying both requirements for the position and job responsibilities of the ISO during emergency incidents?
2. What trends can be identified nationally in fire service injuries and line-of-duty deaths, and how can this information be used to justify the responsibilities that you assign to the ISO position?

Introduction: Defining the Title

The title "safety officer" is used daily in fire departments around the country. Often, this title is used to refer to the individual in charge of a department's entire safety and health program. More often, the title is associated with a fire officer who reports to the incident commander (IC) and is delegated the safety officer task at an incident FIGURE 1-1. In some departments, the safety officer is actually an Occupational Safety and Health Administration (OSHA) compliance officer. In other departments, the training officer is the default safety officer; that is, the training officer's responsibility to ensure safe practices during training activities is extended to department routines and incident activities. Over the past decade, fire departments have discovered that the title safety officer is a bit too generic. In 1991, the Fire Department Safety Officers Association (FDSOA) developed and offered a class titled "Preparing the Fireground Safety Officer." As part of the class, the FDSOA suggested that the safety officer title and responsibilities be divided. A project team audited this class and went on to help the National Fire Academy (NFA) develop courses that split the safety officer role into two titles (and separate curricula): health and safety officer (HSO) and incident safety officer (ISO). The two courses were then developed into field courses and taught across the United States. The titles were divided into HSO and ISO in recognition of certain realities within the fire service. Small fire departments usually had one person who performed both the HSO and ISO roles. Those departments soon realized that one individual could not possibly be present at every incident where an ISO would be desirable and at the same time fill the role of HSO. In large departments, it was clear that the management of a significant occupational health and safety program required knowledge and skills that were markedly different from those required of an ISO.

In the mid-1990s, the National Fire Protection Association (NFPA) task group assigned to update NFPA 1521, *Fire Department Safety Officer*, took the concepts developed by the FDSOA and the NFA and rewrote the standard to reflect the HSO/ISO division. The standard provided a consensus definition for each title, as follows:

- A *health and safety officer (HSO)* is the individual assigned and authorized by the fire chief as the manager of the health and safety program.

FIGURE 1-1 The title of safety officer can mean many things, but it is most often associated with a delegated responsibility at incidents.

- An *incident safety officer (ISO)* is a member of the command staff responsible for monitoring and assessing safety hazards or unsafe situations and for developing measures to ensure personnel safety.

Thus, a division of the safety officer role was written into the NFPA 1521 standard.

Interestingly, the National Incident Management System (NIMS) still uses the generic title of safety officer for NIMS compliance texts and documents. NIMS was developed through Homeland Security Presidential Directive 5 (HSPD-5) to create and mandate a consistent nationwide approach to prepare for, respond to, and recover from domestic incidents regardless of cause, size, or complexity. On its website, NIMS offers a glossary of terms relating to incident command structures, defining safety officer as, "A member of Command Staff responsible for monitoring and assessing safety hazards or unsafe situations and developing measures for ensuring personal safety. The Safety Officer may have Assistants."

The HSO and ISO titles will be used in this text, although there are "NIMS compliance" discussions suggesting that the ISO title revert to the NIMS-preferred safety officer (SOF). The change is already under way. In the 2020 edition of NFPA 1561, *Standard on Emergency Service Incident Management System and Command Safety*, the ISO title has returned to just safety officer (with the corresponding abbreviation SO). (As a side note, the ISO abbreviation is also used in the fire service to denote the Insurance Services Office, an agency that rates fire department capabilities to help insurance companies set policy rates for individual communities.)

For the sake of clarity, let's take a look at some of the functions of HSOs and ISOs. As seen in **FIGURE 1-2**, the HSO focuses on health and safety administration, whereas the ISO focuses on scene-specific operations. It is clear that some overlap occurs—by design. Overlapping functions provides consistency and communication in the different roles. However, before we dive too deep into ISO functions, let's take a quick journey through the history of today's ISO.

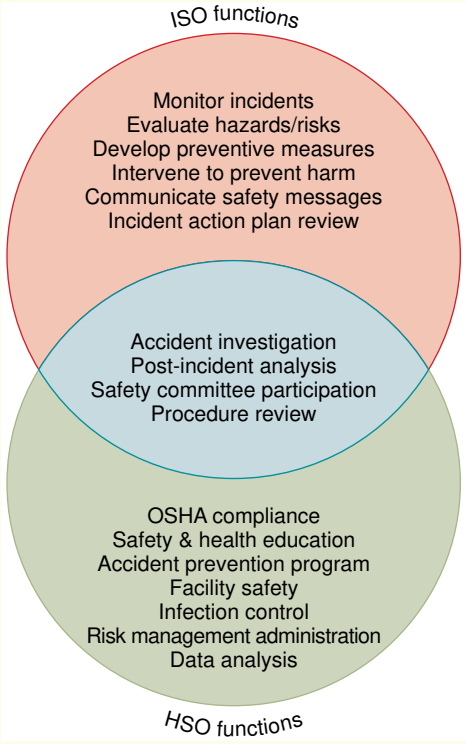


FIGURE 1-2 A comparison of HSO and ISO functions.

History of the Safety Officer Role

Safety officers, in one form or another, have been present in the American work force for a long time. Some of the first safety officers came out of the fire service. In the late 1800s and early 1900s, "wall watchers" stood at corners of buildings and watched the walls for signs of bowing or sagging during a working fire. Speaking trumpets were used to shout out warnings and give orders **FIGURE 1-3**. This practice followed the catastrophic collapse of New York's Jennings Building on April 25, 1854.[1] In this tragedy, 20 firefighters were buried following a partial, then significant collapse of the building at 231 Broadway. In Colorado Springs, in 1898, a decision was made by on-scene officers to withdraw firefighters from a railroad car fire containing black powder. Thirty minutes later,

FIGURE 1-3 The first fire service "safety officer" used speaking trumpets to shout out warnings and give orders.

United States Library of Congress Currier & Ives Collection

the car detonated, causing a wind-fed fire that destroyed many buildings, including the famous Antlers Hotel. These are only a few examples of the safety officer role in its formative days. In some respects, the fire service was viewed as progressive in the "appointment" of safety officers as part of risk management.

As America became industrialized in the late 1800s, laborers suffered difficult working conditions that resulted in numerous injuries (and deaths), leading to employee strikes and riots (particularly in the steel-making industry). The need for an industrial safety professional was beginning to emerge. Signs of this need were felt in World War I when soldiers became mechanized, but it wasn't until World War II that the safety officer role was formalized. World War II, the first fully industrialized war, was unique in that it brought significant injury and death in *support* operations as well as in combat. The military started to look at why people were getting hurt outside of combat, and they appointed safety officers to effect immediate improvements while they developed safer procedures.

Even as World War II continued, factories and other manufacturing industries began looking at the safety of their workers, prompted in part by the inclusion of a significant number of women in the workforce. Some of this introspection came at the request of the insurance industry, while other safety measures came at the request of organized labor. Before long, safety inspections, posters, briefings, and other measures were commonplace in the manufacturing environment. In 1970, Congress passed the Williams-Steiger Act, which created the Occupational Safety and Health Administration (OSHA). President Nixon signed the act into law that December. The law gives equal rights and responsibility to employers and employees with respect to safe working conditions. Today you can find even small businesses with a dedicated safety manager or OSHA compliance officer. In large corporations, an industrial hygienist is tasked with administering risk management and employee safety programs. Safety in corporate America is so prevalent that many careers have been spawned in the safety arena. Colleges, universities, and even vocational schools offer degree and certificate programs in safety and safety-related programs.

Fire Department Safety Officer Trends

Even though some fire departments have been using safety officers for almost a century, the fire service as a whole was slow to catch on to the concepts of safety and risk management in all phases of fire department operations and administration—at least to the degree established by OSHA. The modern roots of risk management and a dedicated safety officer in today's fire service lie in the development and 1987 adoption of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*. The late 1980s and early 1990s found fire departments trying to integrate the safety officer (risk manager) role into the department culture. It's not uncommon to hear individuals describe their appointment to the safety officer position with a story such as the following:

> Our fire chief went to a national conference and heard some guy talk about the need for a department safety officer. NFPA 1500 says you've got to have one. The best person for the job is your training officer. Next thing I know, I'm it!

Unfortunately, there was little fire service training material to tell the newly appointed safety officer what to do. Most training/safety officers received a personal copy of NFPA 1500, read it, and found that the standard was nothing more than a fire service twist on commonplace practices in the industrial world. Granted, some NFPA 1500 issues were controversial (staffing, equipment design, and the like), but the basic premise to develop and administer an active health and safety program was found to be its guiding purpose.

The original Safety Officer Standard, NFPA 1501, predates NFPA 1500 by ten years. That 1977 document had just a few requirements for the duties, responsibilities, and qualifications for the evolving position. NFPA 1501 has since been changed to NFPA 1521 in an effort to standardize NFPA numbering. Both 1500 and 1521 are updated on a regular revision cycle under the guidance of NFPA's Technical Committee on Fire Service Occupational Safety and Health.

Prior to the development of these standards, some safety officer trends were well under way in the fire service. In the 1970s, the FIRESCOPE (Firefighting Resources of Southern California Organized for Potential Emergencies) program was developed and used for multiagency incidents on the West Coast. A safety officer was listed as a command staff position to help the IC with delegated safety duties. In the late 1970s, Chief Alan Brunacini of the Phoenix Fire Department began teaching a "Fire Ground Command" seminar across the country. In this seminar, it was recommended that a safety officer, or safety sector, be established to provide a higher level of expertise and undivided attention to fireground safety. This sector was designed to report directly to the fire ground commander, as well as to advise and consult with other sector officers. In 1983, the International Fire Service Training Association published *Incident Command System*, a manual in which a safety officer position was integral to the command staff; a checklist and organizational chart were included[2] FIGURE 1-4. In other examples, fire departments in large cities, such as the Fire Department, City of New York (FDNY), were creating safety divisions and shift-assigned safety officers to provide injury investigation and incident safety duties.

The National Interagency Incident Management System (NIIMS), used by the National Wildfire Coordinating Group (NWCG), recognizes the safety officer as directly reporting to the IC. NIIMS is a direct descendant of the FIRESCOPE program. Note that the "single I" NIMS used by the Department of Homeland Security is not to be confused with the "double I" NIIMS used by the NWCG. In the NWCG NIIMS, the safety officer can be classified as one of the following:

- Type 1 Safety Officer (SOF1)
- Type 2 Safety Officer (SOF2)
- Line Safety Officer (SOFR)

An SOF1 is qualified to deploy nationwide as part of a national incident management team (IMT). An SOF2 is usually qualified at the state or local level to function at wildland and interface fires or other disasters. Interestingly, the SOF1 and the SOF2 must meet the same criteria for qualification.[3] The line

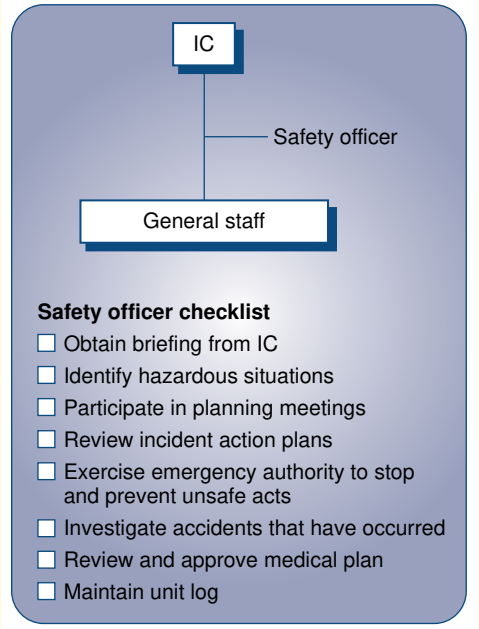


FIGURE 1-4 Initial safety officer checklists were a great start, if overly simplistic.

safety officer (SOFR) can be the safety officer assigned to initial attack operations, the safety officer assigned to incidents that have not escalated to a Type 1 or 2 incident, and the field assistant used by an SOF1 or SOF2. There are approximately 16 predesignated Type 1 IMTs and 32 Type 2 IMTs staged around the United States, responding to incidents on a rotational basis as needed. The National Interagency Coordination Center (NICC) is responsible for assigning the Type 1 and Type 2 IMTs.

In 2004, President George W. Bush signed Homeland Security Presidential Directive 5, *Management of Domestic Incidents*, which mandates the use of NIMS (single I) as part of the National Response Plan (NRP) administered through the Department of Homeland Security. The NRP has recently had its name changed to the National Response Framework (NRF).

The evolution of the safety officer role continues today. For example, the most recent editions of NFPA standards have relocated the duties and responsibilities of the HSO and ISO from the 1521 standard and placed them in NFPA 1500 and 1561 standards, respectively. NFPA 1521 is now written as a professional qualifications document using the job performance requirement (JPR) format to outline specific knowledge and skill objectives for the HSO and ISO. As such, the NFPA standards that currently pertain to safety officers are as follows:

- NFPA 1500: HSO requirements, duties, and responsibilities
- NFPA 1561: SO requirements, duties, and responsibilities
- NFPA 1521: HSO qualifications
- NFPA 1521: ISO qualifications for fire department ISOs
- NFPA 1026: SO qualifications for NIMS safety officers

The Need for an Incident Safety Officer

The role of a fire department ISO is based on a simple premise: We in the fire service have not done a good job of taking care of our own people. As Alan Brunacini, retired fire chief of the Phoenix Fire Department so aptly commented:

> For 200 years we've been providing a service at the expense of those providing the service.

Chief Brunacini is right on target. Thanks to him and many other fire service leaders and fire equipment manufacturers, there have been significant improvements in firefighting equipment, standards, and procedures, all with the intent of making the firefighting profession safer. Concurrently, the United States has seen a decline in the number of structure fires. One would think that the combination of better equipment and fewer fires would lead to fewer firefighter injuries and deaths. Looking at aggregate numbers (all fatalities and injuries), you'll see that progress is being made. Dig deeper, though, and you'll notice that the rate of fatalities and injuries associated with the fireground is not dramatically improving. More than ever, the fire service needs to step up its effort to prepare and use effective ISOs more often. Proof of this imperative can be found in the empirical (statistical) and image factors regarding firefighter fatalities and injuries.

Empirical Fatality and Injury Factors

An ISO who wants to truly make a difference embraces a value that lessons can be learned from each and every firefighter injury and fatality. Understanding statistical trends is part of that value. Various entities collect firefighter injury and fatality data and report them, typically on an annual basis or through investigative efforts. These agencies include the following:

- National Fire Protection Association (NFPA)
- U.S. Fire Administration (USFA)
- National Institute for Occupational Safety and Health (NIOSH)
- International Association of Fire Fighters (IAFF)

The NFPA collects U.S. firefighter injury and fatality statistics associated with line-of-duty activities, including incident response, training, station, and apparatus activities, and other nonemergency activities, while performing official department-related tasks. The USFA collects similar data but classifies line-of-duty deaths (LODDs) differently. The USFA includes what are known as "hometown hero" LODDs—that is, firefighters who have suffered a fatal heart attack *within 24 hours* of an incident response or physically stressful duty-related activity. (The NFPA omits the majority of these LODDs when collecting data.) NIOSH conducts LODD examinations of specific incidents to assist fire departments and the fire service in developing processes and procedures to prevent further LODD or injury occurrences. The IAFF collects and reports on injury and fatality data from its members, which may include those outside the United States.

Knowing which data are collected is a starting point, but what do the numbers say? Let's start with LODDs.

Firefighter Fatalities

Rather than reproducing cited numbers, graphs, and pie charts, the end of this chapter provides a list of references and additional resources where you can find real-time statistics. However, let's highlight some trends that the statistics suggest. We will draw from the USFA data, bearing in mind that prior to the hometown hero divergence (December 2003), the USFA used the NFPA data.[4] Since 1977, an average of 108 firefighters die in the line of duty each year (1997–2017). This average does not include the 343 FDNY firefighters who were killed in the collapse of the World Trade Center Towers on September 11, 2001. Most firefighters will never forget this act of terrorism and the sacrifices made. It is, however, considered a statistical anomaly. Some may argue that using data all the way back to 1977 does not reflect recent preventive efforts developed to improve firefighter safety. We have made progress: From 2004 to 2017, the yearly average for LODDs drops to 101. Some may argue that this number is acceptable considering the risks that a community expects firefighters to take; however, many fire officers believe that no fatalities are acceptable. More than 100 firefighter deaths per year suggest that more preventive efforts are necessary, even though the number is *slowly* trending downward.

Awareness Tip

Trends in Firefighter LODDs

- Overall number: Slowly declining—still averages over 100 per year
- Cardiac related: Declining
- Apparatus related: Declining
- Fire ground related: Increasing
- Leading cause: Overexertion

It is well documented that most LODDs are stress (cardiac) related; however, it is important to note that the percentage of cardiac-related LODDs has started to decline, thanks to many heart-healthy firefighter initiatives. Likewise, the percentage of deaths associated with apparatus incidents is trending downward. Now for the bad news: The percentage of firefighter LODDs due to noncardiac, on-scene causes (e.g., thermal insult, trauma, asphyxiation) is trending upward. The myriad reasons for this problem are being studied, although some fire service leaders believe that it boils down to the following dynamics:

- Society has changed the building (lightweight construction).
- Society has changed the fire (fuels with rapid, high-heat-release rates).
- The fire service has been slow to adapt to the societal changes.

These societal influences are being researched and solutions are being developed, but change is a slow process for most established organizations (not just the fire service). A quick, low-cost solution to the statistical trend of LODDs due to noncardiac events at fires includes the more frequent use of a trained, persuasive ISO. This solution isn't just the opinion of a lone author—NIOSH has repeatedly cited the need for an ISO to help prevent LODDs. The NIOSH "Fire Fighter Fatality Investigation and Prevention Program" has been established (and funded by Congress since 1998) to examine LODDs as a preventive measure to help the fire service.Following an LODD investigation, NIOSH publishes a summary report that includes key recommendations. A reoccurring recommendation cited in dozens of reports asks that fire departments ensure that a separate Safety Officer, independent from the IC, be appointed at each structure fire.

Safety Tip

Separation of ISO and IC

Ensuring that a separate safety officer, independent from the IC, is appointed at each structure fire is a key preventive recommendation cited in dozens of NIOSH LODD investigation reports.

Firefighter Injuries

The NFPA reports annually on firefighter injuries based on a survey sent to fire departments. Returned surveys are then extrapolated to arrive at an estimated injury experience. This method is considered to be accurate within a 5% margin of error.[5] The estimates do break out injuries at the fire ground versus nonfire incidents and other activities. In regard to trends, the estimates show that the combined number of injuries from all activities is slowly declining (a high of 103,340 in 1981 to a new low of 58,835 in 2017). This decline is good news, although 170 injuries per day—or roughly 7 injuries in the time it takes to read this chapter—can be quite alarming. A deeper look at injury statistics reveals an even more alarming trend. The number of injuries on the fireground has been declining—but not as fast as the decline in the number of fires. In fact, when viewed as the number of fire ground injuries per 1,000 fires, the number has been riding a roller-coaster, going up and down between 22 and 25 injuries per 1,000 fires over the past 30 years (*and* over the past 10 years). Given the improvements in personal protective equipment (PPE), equipment design, training, and attention to firefighter wellness, one could view this trend as a failure that demands immediate attention.

Awareness Tip

Trends in Firefighter Injuries

- Overall number: Slow and steady decline to an estimated 58,835 per year
- Nonincident related: Declining
- Apparatus related: Declining
- Fire ground related: Wavering
- Leading type: Strain, sprain, or muscle pain

The most common injuries for all fire service activities are strains, sprains, and muscle pain, followed by cuts, lacerations, and bruises. Considering only fireground injuries (and those that are considered moderate to severe), strains and sprains are still the most common injury type, followed by thermal burns.

Juxtapose firefighter death and injury numbers to the national trend of fewer fires and one can hypothesize that the effort to reduce firefighter LODDs and injuries may not be as effective as it could be. The appointment of an ISO, more often than not, is a prudent measure. Other programs, such as firefighter wellness and incident management systems, do reduce injury and death potential over time, but the use of an ISO can start to reduce these threats *today*.

How many firefighter injuries and deaths have been prevented by the action of a safety officer? We don't know for sure. One Missouri fire chief presented this question when arguing against the cost of formalizing a safety officer program for his department during an open forum on safety issues. No one present at the discussion could answer the question with hard data, although many felt that ISOs did, in their own experience, change a situation that "could have" led to an injury. In one case, an ISO at an Illinois strip mall fire called for the evacuation of a building, and the IC concurred. The firefighters present withdrew and, after protesting the pullout, witnessed the roof slowly collapse into the building. This incident came just a few short years after a firefighter died in a similar roof collapse in a neighboring department. The point is simple: We don't keep good data on what could have been, and at times our memories are too short.

Workers' Compensation

When studying the empirical effects of firefighter death and injury, it would be negligent to skip the effects of work-related injuries on the firefighters' worker compensation insurance coverage. Workers' compensation is statutory for each state, and each state's version has its own intricacies; however, rates are set by the National Council on Compensation Insurance (NCCI). Each state may also adjust rates for firefighters based on experience in that state; this is called an *experience modifier*. To determine a workers' compensation rate for a given department in a state, a formula of NCCI rate × payroll × experience modifier is used. The experience modifier is typically based on a 3-year loss experience.

A few points can be made about workers' compensation insurance. First, and most important, worker compensation programs are not free; they are costly and the cost is based on history: the number of claims and the cost of the claims. Second, a fire department cannot always shop around for a good rate, as individuals do for automobile insurance. If a firefighter is injured on the job, the ramifications may be felt for many years. The more serious the injury is, the longer its effects are felt. Further, this loss affects all employers with employees in the firefighter class. It is easy to imagine the effect of such injuries on the long-term financial status of a fire department.

Clearly, the ever-increasing cost of health care and the constant struggle of balancing operating costs with available tax or other income sources create additional effects when combined with workers' compensation fees. Even one moderate or severe firefighter injury can affect fire department budget-balancing for several years.

Creating and funding a total ISO response system may seem expensive, but the costs of *not* funding such a program can be extraordinary if a fire department experiences a firefighter injury or fatality, especially if the loss could have been prevented by a thoughtful and articulate ISO.

Injury and Fatality Image Factors

The image study (how the general public views us and how we perceive ourselves) of firefighter injury and fatality deals with less tangible issues than quantitative data. Generally speaking, the community image of a firefighter is one of a protector or hero FIGURE 1-5. Likewise, the firefighting profession is often included on many "most dangerous" top 10 lists. Historically, firefighters have worn these images with a certain pride or swagger. More recently, the image fails to realistically depict the effect that a firefighter injury or death has on the *humans* involved.

A firefighter injury requiring hospital care or extended time off creates stress in the workplace. Small career departments have to devote time and effort to find a replacement, while small volunteer departments have to get by without the injured individual. Large departments have to shuffle people to fill-in for the injured firefighter. A less obvious consequence, perhaps, is the firefighter work slowdown following the loss of a fellow firefighter (whether through injury or death). Most fire officers have seen this reaction: Concern, introspection, and even trepidation fill the firehouse following a firefighter casualty event. The more serious the event is, the more pronounced and stressful these reactions can be. If an investigation follows a serious casualty event, the workplace stress can be multiplied to include finger-pointing and taking of sides.

Following a firefighter LODD, members of the affected fire department are likely to be pursued by local media journalists. Social media and blogs are likely to post video clips or images that can lead to critical comments, erroneous or unconfirmed information, and rumors. In worse cases, labor and management concerns might take the form of multiple investigations

FIGURE 1-5 The community image of a firefighter is one of a protector or hero.

Awareness Tip

An Emotional Reality

Concern, introspection, stress, and even trepidation fill the firehouse following a significant firefighter casualty event. Stress affects firefighter safety!

and/or attempts to minimize liability or place blame. Results of LODD investigations that attract media attention can quickly change the public's perception of the hero and protector, raising questions of accountability and the need for discipline. In some cases, career and volunteer officers have been demoted, suspended, and terminated as an outcome of the LODD. In almost all cases, an LODD causes tremendous department, community, and individual stress for those with close ties to the loss.

At the personal level, a firefighter injury can have a damaging effect on the involved families. Stress permeates the injured firefighter's family life. Many firefighters know of a peer who has resigned, been divorced, or developed substance abuse issues following a comrade's injury or death. Firefighters who have survived an incident in which another firefighter was killed are considered at risk of experiencing post-traumatic stress disorder (PTSD), a mental health disorder that can develop in those who have experienced a terrifying ordeal that involved physical harm or threat of harm (more on PTSD in the chapter titled *Post-incident Responsibilities and Mishap Investigations*). Alarmingly, the rate of firefighter suicides are increasing, likely due to the repeated exposure to human trauma, LODDs, and job stress.

Taken collectively, the empirical and image factors paint a compelling picture that more effort is needed to prevent firefighter injuries and deaths. This is not to say that the fire service isn't making an effort. The chapter *Guiding Laws, Regulations, and Standards* will outline several outstanding initiatives and efforts that are under way. The point is that *more* can be done, and one effort—the appointment of a trained and articulate ISO—can have an immediate influence that can help prevent injuries and death.

Incident Safety Officer Responsibilities

Simply put, and to use a popular fire service phrase, the responsibility of an ISO is to make sure "everyone goes home." Most adults assigned a responsibility want to know what their tasks are and the expected outcomes. "Everyone goes home" may be the expectation, but this expression does not define the tasks required to achieve it. In many ways, this entire text addresses the responsibilities of the ISO, as well as the required tasks, education and training, and specific tips that can help meet the expectation that everyone goes home. As a starting point, let's consider a more formal description of the ISO's responsibilities.[6] The ISO is a member of the command staff and is responsible for the following:

- Monitoring incident conditions and activities
- Evaluating hazards and unsafe conditions
- Developing measures that promote safe incident handling
- Intervening when an immediate or potential threat exists
- Communicating urgent and advisory safety messages that help prevent injuries or deaths

Breaking down this description of formal responsibilities can better define what tasks an ISO needs to perform to make sure everyone goes home. Let's start with the action verbs *monitor, evaluate, develop, intervene*, and *communicate*:

- *Monitor.* Actively survey (recon) the incident environment (e.g., buildings, smoke and fire, utilities) and watch the incident activities (e.g., civilians' actions, firefighters' actions).
- *Evaluate.* Assess the environment and activities and judge whether a hazard exists (or is being created) that can cause harm. The hazard judgment must be further assessed relative to a prudent risk-versus-gain mentality.
- *Develop.* Design and create preventive measures (proactive actions for forecasted hazards) that will minimize the chance of harm and promote safe incident handling.
- *Intervene.* Take deliberate actions to prevent harm from imminent and potential hazards.
- *Communicate.* Deliver urgent and advisory messages using multiple communication methods (e.g., face to face, radio, warning signs, written safety briefings).

In many ways, the ISO is the hazard "MEDIC" for an incident because this individual must monitor the environment and activities, evaluate hazard potentials, develop preventive measures, intervene when a threat exists, and communicate urgent and advisory safety messages. Some may say that the MEDIC mnemonic is simple or corny, but it can serve as a reminder for ISO responsibilities.

Regarding responsibilities, it is important to mention that the appointment of an ISO does not absolve other firefighters or fire officers from the responsibility to have situational awareness and to act in a safe manner. Ultimately, though, the IC is responsible for the safety of all those working an incident. The IC is encouraged to delegate the safety *focus* to an ISO, but he or she owns the responsibility. Ideally, *everyone* operating at an incident should have safety responsibilities commensurate with their assignment, as follows:

- *Incident commander.* Ultimately responsible for the safety of all members operating at an incident. Serves as the "safety officer" when no one has been delegated the task.

Getting the Job Done

ISO Responsibilities

Thinking of the ISO as the "hazard MEDIC" for an incident can remind you of the ISO's incident responsibilities:

M = Monitor the incident environment and activities
E = Evaluate hazard potentials
D = Develop preventive measures
I = Intervene when a threat exists
C = Communicate urgent and advisory safety messages

- *Incident safety officer.* Delegated the "hazard MEDIC" responsibility.
- *Company officers and group or division supervisors.* Responsible for accomplishing tactical directives in a safe manner and ensuring that the firefighters assigned to them operate as a team using appropriate PPE.
- *Individual firefighters.* Responsible for using appropriate PPE, performing directed tasks as trained, and maintaining team discipline.

All fire service members operating at an incident should be aware of their immediate environment and communicate observations of hazards that can injure unsuspecting teammates FIGURE 1-6. Likewise, everyone operating at an incident should have the responsibility to take immediate protective actions to prevent an imminent threat from causing harm.

FIGURE 1-6 All fire service personnel handling an emergency have the responsibility to prevent an imminent threat from causing harm.

Wrap-Up

Chief Concepts

- In 1991, the Fire Department Safety Officers Association (FDSOA) developed a class titled "Preparing the Fireground Safety Officer." As part of the class, the FDSOA suggested the division of the safety officer title and responsibilities. A project team then worked with the National Fire Academy (NFA) to split the safety officer role into two titles: health and safety officer (HSO) and incident safety officer (ISO).
- In the mid-1990s, the NFPA task group assigned to update NFPA 1521, *Fire Department Safety Officer*, rewrote the standard to reflect the HSO/ISO division, providing definitions for the roles.
- NFPA 1561 has recently changed the ISO title and acronym to the NIMS-compliant "Safety Officer" with the acronym "SO."
- The title *safety officer* is most often associated with a fire officer who reports to the incident commander (IC) and is delegated the safety officer task at incidents.
- The Williams-Steiger Act of 1970 established the Occupational Safety and Health Administration (OSHA) and solidified the responsibility of employers to create safe working conditions.
- The establishment of the FIRESCOPE project in southern California and Alan Brunacini's "Fire Ground Command" efforts in Phoenix, AZ codified the safety officer role within fire departments.
- The NFPA standards that affect and help guide the ISO include NFPA 1561 (requirements, duties, and responsibilities) and NFPA 1521 (qualifications).
- The U.S. fire service still averages more than 100 line-of-duty deaths (LODDs) annually.
- The National Institute for Occupational Safety and Health (NIOSH) has made a reoccurring recommendation that fire departments ensure that a separate safety officer, independent from the IC, be appointed at each structure fire to prevent LODDs.
- Firefighter injury estimates cite approximately 58,835 per year and show a gradual decline. Unfortunately, fire ground-related injuries have not declined even though the number of fires has.
- Firefighter injuries and deaths seriously affect the workplace through stress. Workplace activities, investigations, public perceptions, and family lives are all affected by the stress of the event.
- The ISO is a "hazard MEDIC." Responsibilities include monitoring the incident environment and activities, evaluating current and potential hazards from a risk-versus-gain perspective, developing preventive measures for forecasted hazards, intervening when immediate or potential threats exist, and communicating urgent and advisory safety messages.
- The IC is ultimately responsible for the safety of all responders working an incident. Nonetheless, all fire service members operating at an incident should have the responsibility to be aware of their immediate environment and communicate observations of hazards that can injure unsuspecting teammates.

Key Terms

health and safety officer (HSO) The individual assigned and authorized by the fire chief as the manager of the health and safety program.

incident safety officer (ISO) A member of the command staff responsible for monitoring and assessing safety hazards or unsafe situations and for developing measures to ensure personnel safety.

National Incident Management System (NIMS) An incident response system developed by the Department of Homeland Security.

National Interagency Incident Management System (NIIMS) An incident response system developed by the National Wildfire Coordinating Group.

post-traumatic stress disorder (PTSD) A mental health disorder that can develop in individuals who have experienced a terrifying ordeal that involved physical harm or the threat of harm.

Review Questions

1. What is the difference between an incident safety officer (ISO) and a health and safety officer (HSO)?
2. In general terms, explain the history of today's safety officer in the industrial world as well as in the fire service.
3. List and discuss the NFPA standards related to the ISO.
4. What was the significance of the Williams-Steiger Act?
5. Discuss current firefighter injury and death trends and the need for ISO response.
6. How is the firefighter image affected by injuries and deaths of fellow firefighters?
7. What is meant by "hazard MEDIC" as it relates to the ISO's responsibilities?
8. Describe the safety responsibilities that are commensurate with the following positions:
   - Incident commander
   - Incident safety officer
   - Company officer
   - Firefighter

References and Additional Resources

Fire Protection Publications. *Incident Command System*. Stillwater, OK: Oklahoma State University, 1983. pp. 19–20, 61.

National Interagency Incident Management System. *Type 1/Type 2 Safety Officer, Task Book; PMS 311-04*. Boise, ID: National Wildfire Coordinating Group, 2009.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*. Quincy, MA: National Fire Protection Association, 2018.

NFPA 1521, *Standard on Fire Department Safety Officer Professional Qualifications*. Quincy, MA: National Fire Protection Association, 2020.

NFPA 1561, *Standard on Emergency Service Incident Management System and Command Safety*. Quincy, MA: National Fire Protection Association, 2020.

NFPA Firefighter injury and death reports and data are available at www.nfpa.org/research/reports-and-statistics/the-fire-service.

NIOSH firefighter fatality reports are available at www.cdc.gov/niosh/fire.

U.S. Fire Administration firefighter injury and death reports are available at www.apps.usfa.fema.gov/firefighter-fatalities/fatalityData.

Endnotes

1 Lyons, Paul Robert. *Fire in America*. Boston, MA: NFPA Publications, 1976.

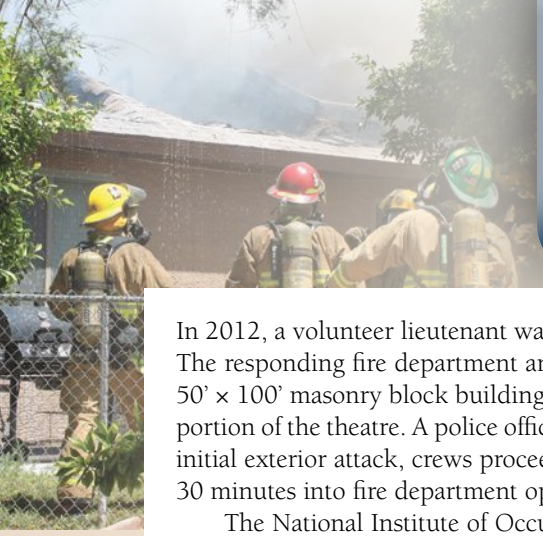
2 Fire Protection Publications. *Incident Command System*. Stillwater, OK: Oklahoma State University,1983. pp. 19–20, 61.

3 National Interagency Incident Management System. *Type 1/Type 2 Safety Officer, Task Book; PMS 311-04*. Boise, ID: National Wildfire Coordinating Group, 2009.

4 The author conducted online research of data posted on the USFA website: www.usfa.fema.gov/fireservice/firefighter_health_safety/firefighter-fatalities. Trends were developed through plotting of data from multiple reports.

5 Two NFPA reports were used to generate the injury trends: Karter, Michael J. *Patterns of Firefighter Fireground Injuries*. NFPA, 2013; and Karter, Michael J., and Joseph L. Molis. *Firefighter Injuries in the United States*. NFPA, 2017.

6 NFPA, NIMS, and OSHA have differing definitions and descriptions for the (incident) safety officer position. The formal description of ISO responsibilities offered here is a hybrid using elements from each.



Smoke: © Greg Henry/ShutterStock, Inc.

INCIDENT SAFETY OFFICER *in action*

In 2012, a volunteer lieutenant was killed and two firefighters were injured when a bowstring roof collapsed at a theatre fire. The responding fire department arrived shortly after noon and observed heavy fire conditions on Side A of the unoccupied, 50' × 100' masonry block building. A brick façade partially masked the presence of an arch-shaped roof over the auditorium portion of the theatre. A police officer reported that a large volume of smoke was issuing from the rear of the structure. After an initial exterior attack, crews proceeded into the building to find and extinguish active fire. The roof collapsed approximately 30 minutes into fire department operations.

The National Institute of Occupational Safety and Health (NIOSH) investigated the incident as part of their Fire Fighter Fatality Investigation and Prevention Program. The investigative report listed ten contributing factors, including the following:

- Risk management principles not effectively used
- Fireground and suppression activities not coordinated
- Incident safety officer (ISO) role ineffective
- Bowstring truss roof construction not recognized
- Fire burned undetected within the roof void space for unknown period of time

The report noted that the responding fire department had a designated safety officer who coordinated the departmental medical and safety and health issues of their members. When available, the SO would be used as an ISO at emergency incidents. According to the report, the SO had never received any formal training on emergency incident expectations of the position. The SO was available at this incident but was occupied at times with fireground activities such as water supply and setting up other fire suppression hose lines.

1. Given the circumstances listed above, what warning signs were present that the roof could collapse?
2. What recommendations would you make to prevent a similar occurrence?
3. Which resource would provide a list of the duties and responsibilities of an incident safety officer?
   - **A.** NFPA 1026
   - **B.** NFPA 1500
   - **C.** NFPA 1521
   - **D.** NFPA 1561
4. Recent data in firefighter LODDs are slowly declining in each of the following areas *except*:
   - **A.** Cardiac
   - **B.** Fireground
   - **C.** Non-incident
   - **D.** Apparatus

CHAPTER

2

Safety Concepts

Flames: © Ken LaBelle NRIFirePhotos.com

Knowledge Objectives

Upon completion of this chapter, you should be able to:

- Describe the safety and health practices accepted by the risk-reduction industry. (NFPA 5.2.1, pp 17–26)
- Identify management principles needed to promote safety in the response environment. (NFPA 5.2.1, pp 17–22)
- List the three components of the safety triad for the operational environment. (p 17)
- Differentiate formal and informal processes as well as procedures and guidelines. (p 17)
- List the qualities of a well-written procedure or guideline. (p 19)
- Discuss the external influences on safety equipment design and purchase. (p 20)
- List and discuss the three factors that contribute to a person's ability to act safely. (p 22)
- Define risk management. (p 24)
- Identify and explain the five steps of classic risk management. (pp 24–26)
- Describe the hierarchy of controls used to reduce accidents and injuries. (NFPA 5.2.1, pp 25–26)

Skills Objectives

There are no ISO skills objectives for this chapter.

You Are the Incident Safety Officer

As you begin to develop and review the organizational documents necessary to establish the position of incident safety officer (ISO) and define the ISO's fire ground responsibilities, you reflect on the recent traumatic firefighter injuries and other near misses that could have resulted in tragedy or life-changing events for your firefighters. The department's administrators understand the necessity of the ISO position as an advocate for crew safety and health, but you sense there is much apprehension regarding the appointment of an ISO.

1. What type of documents or organizational procedures does your department use to direct members on risk-taking expectations and decision making?
2. How would you define the current culture of your department regarding safety concepts and practices? Are members and officers held accountable for failing to observe established guidelines and procedures?

Introduction: Theory Versus Reality

Let's face it: Theory can be boring. Many fire officers would prefer to skip the theory, or bookwork, necessary to become an incident safety officer (ISO); instead, they crave the practical, challenging, and critical aspects of the assignment. However, to become an ISO who can *make a difference*, fire officers must build a foundation of understanding, and that means theory. Although most fire officers agree that effective ISOs need a healthy dose of common sense (a sense of reality), they must also be well grounded in recognized safety concepts (theory), which gives them *un*common sense. Uncommon sense can be described as the ability of the ISO to ask and ponder two questions: What is the worst that can happen here? What is the probability of it happening? To answer both questions, the ISO needs a thorough understanding of safety concepts.

In general terms, these concepts represent acceptable health and safety principles and practices that are common in risk-reduction industries. The concepts are the operational safety triad, the five-step risk management model, and risk/benefit thinking.

The Operational Safety Triad

Creating a safe operational environment is dependent on three components (the triad): procedures, equipment, and personnel **FIGURE 2-1**. To make the operational environment safer, these components should be constantly evaluated, updated, and coached with solid risk management concepts.

Procedures

The word "procedure" is used in a very generic form here to describe all sorts of formal (written) and informal processes that are in place in a fire department. At an incident, it is desirable that working crews apply a series of prescribed procedures or processes to achieve a safe and standard outcome.

A formal process is defined in writing and can take on many forms: standard operating procedures (SOPs), standard operating guidelines (SOGs), departmental directives, temporary memorandums, and the like. In some departments, formal processes are derived from standard evolutions or lesson plans. These evolutions and lesson plans can be drilled periodically, on a rotating basis, to ensure that a crew's response to a given situation is appropriate. Some departments adopt training manuals as their operating standard. A manual may offer choices; for instance, for a hose load, the chosen load can simply be circled in the manual. No matter what the source, the key component is that formal processes and evolutions are in writing. In taking this approach, the department achieves consistency in its operations.

Many departments around the country have adopted SOGs in lieu of SOPs, reasoning that a guideline is more flexible and, therefore, more usable by line officers and incident commanders (ICs). A recommendation to use this term was made to the Lisle-Woodridge Fire Protection District (Illinois) by its insurance carrier as part of a scheduled audit. Some fire departments recognize both procedures *and* guidelines. In this context, procedures are strict directives that must be followed with little or no flexibility, and guidelines are adaptable templates that allow flexibility in application.

An informal process is a process or operation that is part of a department's routine but that is not written. Because they are not written, informal processes are typically learned through new member training, on-the-job training, and day-to-day routine. Both formal and informal processes play an important role in the overall safety of a department.

For the remainder of this chapter, we will use the term SOP. The first step in developing a formal SOP is establishing an administrative process to create, edit, alter, or delete established processes. Once the process is in place, a general format for SOP appearance and indexing is necessary. As seen in **FIGURE 2-2**, the department has chosen to classify SOPs by topic. **FIGURE 2-3** shows a typical SOP format.

Once topics have been defined, the writing of SOPs can begin. It makes sense to write the most important ones first, but which topics are the most important? The department can approach this question in one of two ways, and either can be effective. One way is to perform a needs assessment and flag the areas in which line firefighters and officers need guidance. The other way is to look at external influences, such as Occupational Safety and Health Administration (OSHA) regulations, Insurance Services Office rating schedules, NFPA

FIGURE 2-1 Procedures, equipment, and personnel form the safety triad for incident operations.

1. 1.1 Incident Command System
2. Emergency Ground Operations
   - 2.1 Rapid Intervention Company (RIC)
   - 2.2 Gas/odor investigation*
   - 2.3 Auto alarms*
   - 2.4 Train fires*
   - 2.5 Vehicle fire*
   - 2.6 Fires at postal facilities*
   - 2.7 Emergent driving procedure
   - 2.8 Kaneb pipeline response
   - 2.9 Volunteer and fire apparatus placement for motor vehicle accidents (MVAs)
   - 2.10 Operations involving Thompson Valley ambulance
   - 2.11 Minimal staffing for interior firefighting*
   - 2.12 Fire ground formation and activation of companies*
   - 2.13 Standard fire attack procedures/dwelling fires*
3. Alarm Levels/Dispatching
   - 3.1 City alarm level assignments
   - 3.2 Rural alarm level assignments
   - 3.3 Fire resource officer*
   - 3.4 Fire alarm panel operation and response policy
   - 3.5 Mutual/automatic aid agreement*
   - 3.6 Staffing considerations during adverse weather conditions
   - 3.7 Cancellation procedures for emergency medical service (EMS) and MVA incidents
4. Hazardous Materials
   - 4.1 Hazardous materials operations*
5. Emergency Medical Services
   - 5.1 Duties for non-EMS certified personnel
6. Aircraft Rescue and Firefighting (ARFF)
   - 6.1 ARFF standby policy
7. Technical Rescue and Special Operations
   - 7.1 Vehicle extrication
   - 7.2 Rope
   - 7.3 Trench*
   - 7.4 Collapse rescue*
   - 7.5 Confined space*
   - 7.6 Farm equipment and industrial rescue*
   - 7.7 Loveland dive rescue standard operating procedures
   - 7.8 Use of Civil Air Patrol

*These policies still need to be developed and/or approved.

FIGURE 2-2 A sample SOP index.

standards, and other requirements, and determine which areas affect the department most by *not* having a related SOP. Departments choosing the latter route find that items such as personal protective equipment (PPE), self-contained breathing apparatus (SCBA), equipment maintenance, and patient care get high priority in the writing effort. As a starting point, SOPs should exist for the following:

- Use of PPE and SCBA
- Care and maintenance of PPE and SCBA
- Risk/benefit principles
- Incident response (emergent) driving

- Highway and traffic safety at incidents
- Accident/injury procedures and reporting
- Incident scene accountability
- Firefighter trapped and/or lost Mayday procedures
- Abandon building emergency procedures
- Use of the incident command system (ICS)
- Effective incident rehabilitation for responders
- Infection and chemical exposure control and reporting
- Cancer prevention and contamination reduction

Purpose:

To establish policy and direction to all department members regarding minimal staffing and resource allocation for safe and aggressive interior structural firefighting.

Responsibility:

It is the responsibility of all officers and firefighters engaged in firefighting operations to adhere to this policy. The Incident Commander is accountable for procedure included within this policy.[1]

Procedure:

1. This policy is applicable to situations where the Incident Commander (IC) has made a tactical decision to initiate an *offensive fire attack*, by firefighters, inside the structure. Additionally, tactical firefighting assignments that expose firefighters to an atmosphere that is *immediately dangerous to life and health* (IDLH) dictate the application of this policy.[1]
2. Prior to initiating interior fire attack or exposure of firefighters to an IDLH atmosphere, a *minimum of four (4) firefighters shalf assembte on scene*.[2] These four members shall utilize a "two-in, two-out" concept.
3. The "*two-in*" firefighters that enter the IDLH atmosphere shall remain as partners in close proximity to each other, generally fulfilling the operational role as the *FIRE ATTACK GROUP*. As a minimum, the "*two-in*" firefighters entering the IDLH atmosphere shall have full PPE, with SCBA and PASS device engaged, and have among them a two-way portable radio, forcible entry tool. and flashlight or lantern.

[1]An *IDLH atmosphere* can be defined as an atmosphere that would cause immediate health risks to a person who did not have *Personal Protective Equipment (PPE)* and/or *Self-Contained Breathing Apparatus (SCBA)*. This includes smoke, fire gases, oxygen deficient atmospheres, or hazardous materials environments. For Loveland Fire and Rescue application, an IDLH atmosphere can be further defined as an environment that is *suspected* to be IDLH, has been *confirmed* to be IDLH, or *may rapidly become* IDLH. The use of full protective equipment including an activated SCBA and an armed PASS device is mandatory for anyone working in or near an IDLH atmosphere.

[2]The firefighters must be SCBA qualified and capable of operating inside fire buildings without immediate supervision.

FIGURE 2-3 A sample SOP format.

Getting the Job Done

Formal and Informal Processes

Both formal processes (written) and informal processes (not written but customary) play a role in increasing the overall safety of a department.

What makes a well-written SOP? The answer is simple: It's a well-written SOP if firefighters follow it! Achieving good writing is easier said than done, but at its root, it starts with a clear outline and the use of simple language.

The outline can come from an officers' meeting, direction from the chief, or a sample from another department. Using the format in Figure 2-3, the author should address the reason (purpose) for the SOP, followed by the responsibility of each affected member in achieving the SOP. Some SOPs have responsibilities at different levels. For example, firefighters may have the responsibility to ensure their accountability name tags have been placed on the company's passport. The company officer, on the other hand, may have an oversight responsibility to make sure that all crew members are represented on the passport and to process the passport based on his or her company assignment. The department would have to make sure that a usable policy exists for accountability and that training is provided for system use. Other qualities of a good SOP include the following:

- Simple language
- Clear direction
- Tested technique
- Easy interpretation
- Applicability to many scenarios
- Specificity only in relation to critical or life-endangering points

The benefits of a clear, concise, and practiced SOP are numerous. An SOP can become a training outline, a tool to minimize liability, and certainly a tool to guide your members. Above all, a well-applied SOP improves departmental *safety*.

The ISO's role in procedures deals with application and review, something like a quality control officer's function. To be effective, the ISO needs to know which SOPs are being applied to a given situation and whether the SOP is accomplishing what is intended. When the SOP is not being used appropriately or at all, the ISO needs to interpret whether the actions of firefighters meet the intent of the SOP or whether injury potential exists because the SOP is not being followed. The practical application of SOPs puts the ISO in the *best* place to suggest changes to SOPs or even help create new ones for the department. The ISO who witnesses a failure to follow SOPs during an incident should make a notation and bring up the infraction during post-incident analysis or the next scheduled safety committee meeting. If the failure to follow an SOP presents a potential or imminent danger, the ISO must intervene.

Getting the Job Done

SOP Quality Assurance

The ISO's role in procedures deals with application and review. The ISO who witnesses a failure to follow SOPs during an incident should intervene if an imminent threat of harm exists. Otherwise, the infraction should be brought up in a constructive manner following the incident. The ISO is also in a unique position to spot performance- and safety-related trends and feed-forward those observations to help develop or adjust SOPs.

Equipment

In the past few years, the fire service has seen a veritable explosion in new equipment designed uniquely for improved safety. What works? What doesn't? What's a fad? What's here to stay? What's essential? How much does the equipment cost? Is it worth buying? How long will it last? Will it be outdated soon? Fire departments must reach sound, defensible answers to such questions before spending limited resources and chancing adverse outcomes on new equipment.

With so many questions and so much time spent answering the questions, too often fire department efforts to improve firefighter safety become focused on equipment, and there is a tendency to blame equipment following an accident. (We have all seen how much easier it is to blame equipment than to blame a person.) To some degree, this blame is predictable. Let's call it the Blame Game.

Blame Game 1:

Example 1: "Chief, it wasn't my fault—the darn [*insert name of equipment*] broke."
Example 2: "Chief, if I only had one of those new [*insert name of equipment*], this would have never happened."

Equipment helps, but it is arguably the least important factor in the operational triad of procedures, equipment, and personnel. Yet when building an understanding of the safety triad concept, we have to explore equipment and how it can improve a department's safety. The following factors can be used to evaluate equipment, its selection, and its use.

Department Mission

By looking at a fire department's scope of offered services, we can quickly determine whether it lacks the equipment necessary for safe operations. This is actually quite easy to accomplish. To start, department officers should get together and make a list of the types of incidents handled by their jurisdiction. This list is accompanied by a corresponding list of equipment necessary to *safely* handle the incidents (to the degree that the fire department is responsible). As an example, many departments faced an influx of service calls for the activation of residential carbon monoxide detectors, which are designed to activate with as little as 20 parts per million of carbon monoxide present in the air. Yet many fire and rescue agencies lacked calibrated instrumentation to confirm the presence of carbon monoxide in a home. From this national experience, many departments began carrying high-tech, multi-gas monitors to assist in the safe handling of this type of incident.

With the two lists in hand, officers must discuss the equipment possibilities and place a check mark next to the items that are *essential* to safe operation and a circle next to the *nice-to-have* items. They need to stay focused in this process. The officers then compare the list of required equipment to the equipment on hand. Items that need to be obtained can then be prioritized for evaluation, budgeting, and appropriation.

External Influences

When looking for equipment to make incident operations safer, officers need look only to the advertising pages of the many trade journals or scan through the dozens of safety supply catalogs sent to the firehouse. A better tack, however, is to look at *required* equipment. Although requirements vary from state to state, you can consult the following for help in determining what is required:

- *OSHA regulations.* Known as the Code of Federal Regulations (CFR), these regulations often outline the equipment required for a given process to be accomplished. Currently, states covered under a state-sponsored OSHA plan may have more stringent equipment requirements for public agencies. Those without a plan do not require OSHA compliance from public agencies. For example, Colorado has no state plan; fire departments have no obligation to follow OSHA. However, the state of Washington has its own plan (Department of Labor and Industries), and compliance is mandatory for all public agencies. OSHA reform is constantly being debated at the federal level. Soon, all public agencies may fall under more restrictive federal OSHA regulations.
- *NFPA standards.* The vast majority of fire service equipment is tailored to meet or exceed NFPA standards. These consensus standards are designed to offer a minimum acceptable standard for equipment design, application, and maintenance.
- *National Institute for Occupational Safety and Health (NIOSH), American National Standards Institute (ANSI), Factory Mutual (FM) Approvals, and Underwriters Laboratories (UL).* Many equipment manufacturers use these agencies to show that their equipment meets or exceeds design and performance requirements.

Equipment Maintenance

As most firefighters know, equipment used for incident operations requires a dedicated care and maintenance program. Following an injury accident, much time is spent evaluating the performance of involved equipment. Often, the piece of equipment is found to be inappropriate for the application or not operationally sound.

Because many firefighters may use and maintain a piece of equipment, the complete documentation of repairs and maintenance is essential. Further, a complete set of guidelines should be developed or adopted for essential equipment. Rich Duffy, Director of Occupational Health and Safety for the International Association of Firefighters (IAFF), and Chuck Soros, retired Chief of Safety for Seattle, Washington, suggest considering seven items when writing equipment guidelines:[1]

1. Selection
2. Use
3. Cleaning and decontamination
4. Storage
5. Inspection
6. Repairs
7. Criteria for retirement

The Right Equipment

A quick look at firefighter injury and death statistics shows *what* equipment can make a difference. The following are equipment items that have made a difference in firefighter safety over the past few years. This list is designed to stimulate

conversation in your department, in the hope of leading to wise equipment changes or purchases. Like any equipment, the following equipment is worthless if it is not used and maintained by trained firefighters.

- **Personal protective equipment (PPE)** FIGURE 2-4
  - Task-specific PPE ensembles
  - Accountability passports and electronic personnel tracking systems
  - Disposable EMS masks/gloves
  - Water-free hand disinfectant
  - Integrated PASS devices and heads-up displays for SCBAs
  - "High-visibility" materials/colors/vests
  - Nomex®/PBI/P84/Kevlar® materials
- **Apparatus** FIGURE 2-5
  - Enclosed cabs
  - Intercom/radio headsets
  - Three-point, oversized seat belts for all riding positions
  - Quick-deploy scene lighting
  - Mobile data terminals (laptop computers and smartphones and tablets)
  - Ergonomically friendly hose beds
  - Vertical exhaust pipes
  - Wide reflective trim and rear-collision avoidance striping
  - Roll-up compartment doors and roll-out trays
  - Global Positioning Systems (GPS)
  - Automatic vehicle locators (AVLs)
- **Tools** FIGURE 2-6
  - Multi-gas detectors/monitors
  - Speed Shores
  - Rehabilitation kits
  - Command/accountability status boards
  - On-scene contamination reduction kits
  - Two-way radios for each firefighter on a crew
  - Thermal imaging cameras
- **Station equipment**
  - Exhaust removal systems
  - Aerobic and strength exercise devices
  - Dedicated disinfection systems/areas
  - Fire suppression sprinkler systems
  - Extractors for washing structure firefighter clothing
  - Open-air/forced-air protective gear storage systems

FIGURE 2-4 Firefighters have a wide array of task-specific PPE ensembles to choose from.

The effective ISO understands the relationship of equipment to safety. Remember, equipment is arguably the least important facet of the safety triad. In some cases, equipment designed to improve safety can actually lead to greater risk-taking. As an example, consider the structure fire suppression ensemble. The protective (insulative) quality of structural gear is given as a relative value known as the thermal protective performance (TPP) rating. A TPP rating is quite scientific, although in simple terms it is a measurement given to the durability of equipment when exposed to a flash fire event. Today's gear has such high insulative qualities (i.e., high TPP) that it could mask the sensation of heat and allow a firefighter to move into a dangerously hot environment. Unfortunately, many firefighters are trained to use the sensation of heat to help monitor their environment. If the PPE gear masks the

FIGURE 2-5 Safety features continue to evolve in the design and manufacturing of fire apparatus.

FIGURE 2-6 High-tech tools can help firefighters monitor conditions and improve their situational awareness.

sensation of heat, by the time a firefighter finally senses alarming heat levels, he or she is in a perilous situation. The effective ISO understands this.

Personnel

When discussing the effect of people on safety, many opinions, philosophies, and emotions must be considered. For the most part, firefighters won't throw their fellow firefighters under the bus when figuring out why an accident occurred. It is easy to blame the accident cause on an equipment deficiency or on a poor or nonexistent procedure. Once again, we can see this in our day-to-day station dialogue:

> ***Blame Game 2:***
>
> Example 1: "Chief, if we only had a procedure that addressed [*insert issue*], this would have never happened.
> Example 2: "Chief, I'm really sorry Firefighter Jones got hurt, but I followed SOP Number 302 exactly."

It is more difficult to address the "people" component of the safety triad because of the opinions and emotions involved. Regardless, personnel are an essential factor in improving safety. There are three factors that must be addressed as part of the personnel leg of the safety triad: training, health, and attitude.

Safety Tip

The "People" Part of Safety

Three factors contribute to an individual's ability to act safely:

- Acquired training and education
- The person's physical and mental health
- The person's general and current attitude

Addressing each factor is essential, although doing so can be difficult because of the opinions and emotions that may be involved.

Training

A successful safety program usually works in tandem with a successful training program. Conversely, an organization plagued by injuries or suffering from costly accidents usually has a deficiency in its training effort.

As it relates to safety, what makes a training program effective? First, some specific qualities should be present in the training:

- Clear objectives
- Applicability to incident handling
- Established proficiency level
- Identification of potential hazards
- Definition of the acceptable risk to be taken
- List of options, should something go wrong
- Accountability to act as trained

Second, the training program must include the right subjects. Although arguments can be made for which training subjects or behaviors are most important for safe operations, a compelling list can be developed based on firefighter injury and death statistics. FIGURE 2-7 lists training subjects that directly affect incident safety; if personnel are trained in these subjects and if they appropriately apply the training, incident operations will become safer. For each item in the list, there is an expectation of the depth of understanding and methods required.

Essential Training Subjects for Increased Incident Safety

Subject	Degree of Understanding
• Personal protective equipment	Mastery
• Accountability systems	Mastery
• Company formation and team continuity	Mastery
• Fire behavior and phenomena	Proficient
• Incident command systems	Proficient
• Apparatus driving	Proficient under stress
• Fitness and rehabilitation	Practitioner

FIGURE 2-7 Injury and death statistics help to suggest the essential training topics that lead to safer operations.

Often, the terms training and education are used synonymously. In reality, they are different. Training is the process of learning and applying knowledge and skills. Education is the process of developing one's analytical ability using principles, concepts, and values. Simply stated, training deals with *how* to do something and education is the understanding of *why* you do something. The fire service rightfully focuses on training; we want firefighters to perform tasks in a safe and standard manner. Ideally, we should also invest in safety education (and many fire departments do). In many ways, it is safety *education* that helps to shape an individual's values and attitudes (covered later).

Health

The safety and well-being of firefighters are enhanced when they improve their overall health. Much has been written on the benefits of healthy firefighters, most of which centers on *physical* health. Yet stress or overexertion continues to lead in causes of firefighter line-of-duty deaths and is a significant contributor to injuries. To handle the inherent stress of firefighting, each firefighter's body must be accustomed to and capable of handling stress. Additionally, firefighters need to protect themselves from, and prevent the spread of, communicable diseases and infections. The following are some keys to improving physical health and therefore department safety:

- Annual health screening for all firefighters and line officers
- Vaccination and immunization offerings
- A process to determine an individual's firefighting fitness
- Access to a department-designated physician
- Work hardening and mandatory ongoing fitness programs
- Firefighter fueling (nutrition) education
- Effective rehabilitation strategies, including hydration, active cooling, and refueling

Attention to physical health is indeed important, but mental health is also important to firefighter safety. Historically, the fire service has been slow to address mental health issues. Thankfully, the issue of responders' mental health is gaining much more attention. Starting with the formal and informal critical incident stress management (CISM) programs of the 1980s, the fire service has been shifting toward the inclusion of behavioral health professionals to help address atypical stress events, long-term occupational exposure to human suffering, post-traumatic stress disorders, and the alarming rate of firefighter suicides. The following actions are fundamental in supporting firefighter mental health:

- Training firefighters to recognize atypical incident stress signs and symptoms
- Creating professional and peer outreach options for suicide prevention
- Including firefighters' families in social, educational, and team-building events
- Accessing local and national resources to help in implementing a behavioral health program for department members

Attitude

Of all the people factors affecting safety, attitude is the hardest to address. Perhaps this is why firefighter attitudes receive the least amount of attention when it comes to safety efforts. As mentioned, firefighters generally take care of each other and are more likely to "blame" equipment and procedures as contributors to a mishap. Unfortunately, there seems to be a general societal trend of placing blame on others. This disturbing attitude trend can make its way into the fire house blame game.

Blame Game 3:

Example 1: "Chief, it's not my fault. How was I to know [*insert someone's name*] was going to [*do whatever*]?"
Example 2: "Chief, I was just doing what we've always done. I didn't think [*insert the event*] could ever happen."

Many factors affect the attitude of an individual, and attitudes are dynamic. Of the many factors affecting safety attitudes, the following few are especially prevalent in the fire service:

- The *safety culture* of a department
- The *firefighter death or injury history* of a given department
- The *example* set by chiefs, line officers, and veteran firefighters

The Safety Culture

The department's safety culture is made up of the ideas, skills, and customs that are passed from one "generation" to another. How does one see and, more importantly, measure a department's safety culture? To illustrate a safety culture, consider the following two firehouse conversations.

Sometown Fire Station 1:

Apparatus Operator: Hey, Cap', I left the ground ladders up on the drill tower. We'll use them to do rescue drills with Engine 2 after lunch.
Captain: Hope they don't blow over and hit someone.
Apparatus Operator: Nah, it's a nice day.
Captain: OK, but if something happens, I didn't see anything.

Anytown Fire Station 1:

Apparatus Operator: Hey, Cap', I left the ground ladders up on the drill tower. We'll use them to do rescue drills with Engine 2 after lunch.
Captain: That may not be a good idea. There's people coming and going and I'd hate to see one blow over and hit someone.
Apparatus Operator: Naw, it's a nice day.
Captain: I know, and I know it's a pain to put them all away just to put them back up, but I'm serious. We shouldn't leave an unattended ladder up. How about tying them off with webbing?
Apparatus Operator: Good idea Cap'. I'm on it. [*Walks away*.]

It is easy to see the two different attitudes toward safety. Ideally, your personnel are working for Anytown Fire Station 1. The culture of the department may be reflected in its daily conversations or in its actions. In a unique example, the Denver Fire Department experienced a significant accident in which two apparatus collided en route to a reported fire. The department ruled that the most significant factor leading to the accident was the department's attitude that condoned competition between companies to be the first one to get water on the fire.

Fire departments with a long and proud history of no line-of-duty deaths or significant injuries can fall into another trap: Simply stated, they believe such events cannot happen in their department. The conversation at this firehouse goes something like this:

Firefighter 1: Did you hear about the firefighter death in [*insert name of state*]?
Firefighter 2: Yeah, I saw the fire on [*insert social website*]. They're amateurs. That ain't gonna happen here.

Do you see the trap?

The Death and Injury History

The department's firefighter death or injury history is a factor in the attitude of its firefighters. A firefighter line-of-duty death often shocks a department's members into an attitude change. Dr. Morris Massey calls this a "significant emotional event" in his renowned video, *What You Are Is Where You Were When*. A traumatic death is capable of changing a person's value programming, often in the direction of a more healthy safety attitude. While some departments may dismiss a death as purely accidental, most seek to change the way they do business to ensure that the event never repeats itself. The death of Bret Tarver at the Southwest Supermarket fire in Phoenix, Arizona (March 14, 2001), triggered a sweeping change in procedures, training, and attitudes.[2] On June 18, 2007, nine firefighters died following a rapid fire spread and collapse of the Sofa Super Store in Charleston, South Carolina. The event and subsequent investigation reports triggered major changes for the Charleston Fire Department as well as many other fire departments around the country. As these examples demonstrate, a significant emotional event can trigger changes.

The Example Set Within the Department

The example (or lack of it) set by the line officers and veteran firefighters is very important. Legendary Notre Dame football coach Knute Rockne once said, "One man practicing sportsmanship is far better than a hundred teaching it." The same can be said about safety. Is safety merely being taught, or is it being practiced? One look at your own department can reveal whether the following safety indicators are being practiced:

- *Crews or company members are watching not only themselves, but also their team members.* Some examples are crews that make quick, head-to-toe checks of each other just prior to an interior firefighting entry; crew integrity that prevails at *all* incidents *all* the time; company officers who give brief safety reminders prior to tactical assignments; tool operators who voluntarily pass a tool to another operator when initial efforts are unsuccessful; firefighters who offer protective equipment reminders that are welcome and expected; rehab and SCBA attendants who are organized for quick recognition of fatigue and equipment problems.
- *Work areas are neat and organized.* A Pennsylvania safety officer once said that he could tell if a department had embraced safety from a simple tour of the apparatus bay and the firehouse lounge. Although the evidence is clear that a clean workplace is a safe workplace, it is best to look to the actions of individuals. Do firefighters routinely correct trip hazards while working on a project? Are swing-open compartment doors closed as soon as a tool is retrieved? Are doorways kept clear at the station as well as at the incident site? Do apparatus operators routinely point out obstacles to firefighters wearing masks? Is out-of-service equipment immediately flagged at the incident scene?
- *Drivers are calm, consistent, and attentive.* Safe drivers are usually the ones who follow a simple routine that begins with a confirmation of the incident location with the company officer. The driver then proceeds to the apparatus in such a way as to get a 360-degree (circle) check of the apparatus. The driver does start-up and seat belt checks and then a passenger check (is everyone ready?). After a go signal, he or she does a mirror check, looks up at the bay door, and visually scans the apron. Finally the vehicle moves. The driver stops before entering the roadway. Out on the road, the driver gives the sense of control with very few quick-jerk movements: Acceleration is smooth, braking is firm and straight, and cornering is like riding a rail. The driver's eyes are always moving and attentive. Face muscles are relaxed, and both hands are graceful in steering (and shifting).
- *Observations are openly shared.* ISOs see one of the most reassuring measures of instilled safety values when firefighting teams and company officers report hazards to *them*. Another positive indicator is when personnel are spending time looking *up* and looking *around*. Teams are pointing at walls, wires, and windows. Among the crews is heard, "Watch out for this . . ." or "Keep an eye on that . . ." The crews themselves will put up exclusionary barrier tape around firefighter hazards or collapse zones. The more you see and hear of these behaviors, the further advanced are the safety values of the firefighters.

Presumably, you can look at this list and assess where your department stands on the attitude scale. Remember, however, that attitude changes are slow and often emotional, and they require a lot of buy-in. Set goals for yourself. Be the example, and then work for small but steady changes in the department.

Five-Step Risk Management

Every day we take risks. Risk can simply be defined as the chance of damage, injury, or loss. Risk management is the process of minimizing the chance, degree, or probability of damage, injury, or loss. Risk managers in most industries use a five-step process called *classic risk management* FIGURE 2-8. An understanding of this process can help the ISO make a difference.

Step 1: Hazard Identification

Identifying hazards is the primary function of an ISO. In the fire service, we may view many operations as routine and not as hazardous, but they are dangerous nonetheless. A great example is smoke. A firefighter breathing through an SCBA does not see smoke as a hazard, whereas the unprotected civilian avoids the smoke to prevent coughing and tear-filled eyes. With today's plastics, one breath of dark smoke can cause dizziness, loss of sensation, and even unconsciousness. Benzene, a known carcinogen, can cause lung cancer with one exposure. Hydrogen cyanide is a more prevalent smoke by-product gas today and can linger long into overhaul operations. Yet how often do you see firefighters breathing smoke during overhaul?

For most ISOs, identifying hazards is a real-time process of monitoring the incident environment and activities. Previous training and education efforts help the ISO spot current and evolving hazards. This real-time hazard identification approach is desired and beneficial but is *not* how the risk management community identifies hazards. Those in the risk profession use loss history to identify

FIGURE 2-8 The five-step risk management model is used by safety professionals in most disciplines.

hazards; namely, they research injury, death, and property damage data to spot trends and identify hazards. The historical approach for spotting hazards might be appropriate for a fire department HSO or for training ISOs, but it is much too reactive for a real-time incident. Once a hazard has been identified, it needs to be evaluated.

Step 2: Hazard Evaluation

Once a hazard has been identified, it has to be assigned relative importance. In this step, a value is established for a hazard in terms of frequency and severity. *Frequency* is the probability that an injurious event can happen, and it can best be described as low, moderate, or high based on the number of times that a particular hazard is present or the number of times injury results from the hazard. The same descriptions of low, moderate, or high can be applied to severity. *Severity* can be viewed as a harmful consequence or cost associated with injury or property damage from a given hazard. Using this approach, a risk matrix can be plotted, resulting in nine categories of risk FIGURE 2-9.

Once again, those in the loss-prevention profession use data to help establish the values of severity and frequency. The ISO at an incident uses training, education, and, frankly, intuition to make these judgments. The ISO rarely plots a matrix on scene but can mentally picture it. With this matrix, a value can be assigned to a given hazard. This value helps to determine the priority, or level of importance, of the hazard.

Step 3: Hazard Prioritization

Clearly, a hazard that ranks as high frequency and high severity is one we want to avoid or immediately correct at all cost. Conversely, a low-frequency, low-severity hazard typically warrants less attention. A good example is the classic division of fire ground strategies: offensive and defensive. A well-involved fire that has captured the attic space in a lightweight wood construction is a high-frequency, high-severity situation; that is, it will produce a devastating collapse (and potentially severe injury) in nearly every case. On the other hand, we do not spend much time worrying about the hazards associated with investigating smoke caused by overcooked popcorn in a microwave: Sure, there are hazards associated with the smoke, a potential for the kernels to smolder, and possible damage to the microwave, but all of them are easily corrected and rarely (frequency) lead to an injury or costly damage (severity). One method to simplify this matrix and priority system is to divide the matrix into three hazard classes—priorities 1, 2, and 3 FIGURE 2-10.

As a starting place, the ISO should address any hazard that falls in the priority 1 category. During some incidents, the ISO may never get an opportunity to address priority 3 items. If the incident is such that only priority 1 hazards get attention, then the ISO or IC may consider expanding the safety role to include assistant safety officers (ASOs) or change the incident action plan to better fit the hazards present.

Step 4: Hazard Control

Once a hazard has been prioritized, efforts can be made to minimize exposure to the hazard or to correct the hazard. The overall strategy of hazard control is called mitigation. Mitigation is accomplished using a hierarchy of controls to reduce the potential for accidents and injuries. Safety professionals have developed many variations of the "accident prevention hierarchy of controls." Some are developed to address workplace engineering while others are designed to address human behaviors. In the simplest form, a control hierarchy includes the following steps: (1) Design, (2) guard, and (3) warn. A more complex hierarchy would include the following:

1. *Eliminate* through design.
2. *Substitute*. For example, use a less dangerous chemical or material.
3. *Isolate*, usually through containment or enclosure.
4. *Adopt engineered controls*, including add-on devices such as fans or spark-arresting features.
5. *Apply administrative controls*. Examples include training, procedures, etc.
6. *Use PPE*. Bear in mind, this measure is a last resort.

Control hierarchies are well represented in the design of fire stations, apparatus, equipment, and hopefully training activities. They may not, however, be applicable to firefighters handling a real-time dynamic incident at a "who-knows-where" type of location involving a "who-knows-what" type of circumstance. The hierarchy concept, however, can be molded to the incident-handling aspect of the fire service.

The fire service mitigation hierarchy refers to a preferred order of hazard control strategies:

- Elimination
- Reduction
- Adaptation
- Transfer
- Avoidance

Hazard Evaluation Matrix

Severity \ Frequency	High	Moderate	Low
High	High/High	High/Moderate	High/Low
Moderate	Moderate/High	Moderate/Moderate	Moderate/Low
Low	Low/High	Low/Moderate	Low/Low

FIGURE 2-9 Identified hazards should be judged as low, moderate, or high in terms of frequency and severity. This approach can be represented by a matrix.

Hazard Priorities

Severity \ Frequency	High	Moderate	Low
High	High/High	High/Moderate	High/Low
Moderate	Moderate/High	Moderate/Moderate	Moderate/Low
Low	Low/High	Low/Moderate	Low/Low

First Priority Second Priority Last Priority

FIGURE 2-10 Once classified, hazards can be prioritized. This can help the ISO juggle multiple hazards.

For firefighting operations, hazard avoidance and transfer are not always possible. In most cases, the fire department was called to *eliminate* the hazard! Prior to elimination, though, hazard *adaptation* and *reduction* are the control methods most often employed at an incident. Hazard adaptation can be accomplished in many ways and in many forms. The actual action used for mitigation is called a countermeasure. For example, if the mitigation strategy of *adaptation* is used at a structure fire, the countermeasures would include a high gallon-per-minute flow rate, flow path management, sound tactics/procedures, PPE, and the like. An example of hazard *reduction* would be the strategy of fuel alteration in the path of an advancing wildfire using the countermeasures of dozer breaks, burn-outs, and wet lines. An example of hazard *avoidance* is the strategy of just letting something burn itself out. The countermeasures to achieve avoidance can include creating no-entry or exclusionary zones and marking them with barrier tape or posting sentries to make sure nobody enters the zoned space.

Getting the Job Done

Hazard Control Language

- *Mitigation:* The overall strategy used to control a hazard or hazards
- *Mitigation hierarchy of control:* The preferred order used for mitigation—elimination, reduction, adaptation, transfer, and avoidance
- *Countermeasures:* The specific actions used to accomplish mitigation (e.g., PPE, fire streams, zoning, barriers, ventilation, shoring, lock-out/tag-out)

Step 5: Hazard Monitoring

If the risk management approach is effective, the department should see a decline in injuries, accidents, and close calls over time. Changes in equipment, staffing, and procedures can create, alter, or eliminate hazards. Constant monitoring can catch the changes and lead to proactive hazard control. In one example, a city government experienced a notable increase in employee back injuries. The city risk manager hired a back-injury prevention specialist and in less than two years virtually eliminated back injuries. The program paid for itself in those two years by a reduction in workers' compensation claims. This, in turn, lowered the city's loss history, which lowered its annual premium. The savings were used to help fund employee benefits (health club memberships).

At an incident, the ISO is always monitoring hazards, even after hazard countermeasures are implemented. This is cyclic thinking—that is, the ability to revisit hazards and continually assess the operations and the environment to determine whether a hazard is truly being mitigated. Just as a fire is dynamic, so must ISOs be cyclic in their evaluation of risk. An excellent phrase that captures the essence of this last step was presented in the U.S. Fire Administration's publication *Risk Management Practices in the Fire Service*: "Risk management is a system, not a solution."[3]

Risk/Benefit Thinking

The five-step risk management model is a process for assessing and addressing hazards. One weakness of the five-step model is that there are no provisions for acceptable risk-taking. For this reason, fire service practitioners of the model often overlay the specifics of the second step and fourth step, hazard evaluation and hazard control, with a simple question: Are the risks being taken by firefighters (hazard exposure) worth the benefit that can be gained (such as saving another human)? We call this risk/benefit thinking. The hallmark of a good ISO—and any decision maker for that matter—is the ability to continually reassess risk versus benefit. We talk about this process in greater depth in the *Reading Risk* chapter.

Wrap-Up

Chief Concepts

- Acceptable safety and health practices begin with an understanding of the concepts of the operational safety triad and the use of a five-step classic risk management model.
- The management principles needed to promote safety in the response environment are defined in the *operational safety triad*. The triad includes three elements that need to be addressed: procedures, equipment, and personnel.
- Various formal and informal processes make up the procedure arm of the triad. Formal processes are defined in writing, while informal processes are practiced day to day but are not defined in writing. More specifically, the word "procedure" is used to describe strict processes that should be followed with little deviation. "Guideline" is used to describe processes that are outlined in a flexible template with room for deviation or exception.
- The best quality of a well-written procedure or guideline is that everyone adheres to it. Other qualities include clear direction, simple language, easy interpretation, and broad application except for life-endangering points.
- When making equipment purchasing decisions, several external influences need to be considered. They include the OSHA Code of Federal Regulations (CFR), compliance with NFPA standards, and product listing with Underwriters

Laboratories (UL), American National Standards Institute (ANSI), and other product testing agencies.

- The personnel leg of the safety triad includes programs that address member training, health, and attitude. Training topics can be prioritized using data assembled from firefighter injury and death incidents. Health issues include efforts to develop and implement programs that impact physical and mental needs. Attitude issues are typically harder to address but should include attention to the department's safety culture and values, injury and death history, and example set by personnel.
- Risk can be defined as the chance of injury or loss, whereas risk management is the process of minimizing the chance, degree, or probability of injury or loss. The most common form of risk management includes the use of a five-step process: Identify, evaluate, prioritize, control, and monitor hazards. The person managing this process often must apply a risk/benefit mentality to the second and fourth steps (evaluate/control).
- The hierarchy of controls used to reduce accidents and injuries is accomplished using mitigation strategies and countermeasures. An incident-handling hierarchy of mitigation includes hazard elimination, reduction, adaptation, transfer, and/or avoidance. These strategies are achieved through specific countermeasure actions, such as the use of PPE, high flow rates, flow path management, well-trained and applied procedures/tactics, zoning, and lock-out/tag-out.

Key Terms

assistant safety officer (ASO) A member of the fire department appointed by the incident commander to assist the ISO in the performance of the ISO functions at an incident scene.

Code of Federal Regulations (CFR) OSHA regulations that often outline the equipment required to accomplish a given process.

countermeasure An action used to effect hazard mitigation.

education The process of developing one's analytical ability using principles, concepts, and values.

formal process A process defined in writing. It can take on many forms: standard operating procedures, standard operating guidelines, departmental directives, temporary memorandums, and the like.

guideline An adaptable template that offers wide flexibility in application.

informal process A process or operation that is part of a department's routine but that is not written. Because such processes are not written, they are typically learned through new member training, on-the-job training, and day-to-day routine.

mitigation The overall strategy of hazard control.

mitigation hierarchy A preferred order of hazard control strategies: elimination, reduction, adaptation, transfer, and avoidance.

procedure A strict directive that must be followed with little or no flexibility.

risk The chance of damage, injury, or loss.

risk management The process of minimizing the chance, degree, or probability of damage, loss, or injury.

thermal protective performance (TPP) A value given to the protective (insulative) quality of structural firefighting PPE and equipment.

training The process of learning and applying knowledge and skills.

Review Questions

1. List the three elements that make up the operational safety triad.
2. Explain the difference between formal and informal processes.
3. Describe four qualities of a well-written procedure.
4. List and describe the external influences that can affect safety equipment design and purchase.
5. List and briefly describe the three factors that influence a person's ability to act safely.
6. Define risk management.
7. List and explain the five steps of classic risk management.
8. What is the difference between mitigation and countermeasure?
9. List an accident prevention control hierarchy that can be applied to fire department incident handling.

References and Additional Resources

Federal Emergency Management Agency. *Risk Management Practices in the Fire Service, FA-166*. Emmitsburg, MD: U.S. Fire Administration, 1996.

Kipp, Jonathan D., and Murrey E. Loflin. *Emergency Risk Management*. New York: Van Nostrand Reinhold, 1996.

NFPA 1250, *Recommended Practice in Fire and Emergency Service Organization Risk Management*. Quincy, MA: National Fire Protection Association, 2015.

Safeopedia provides articles, definitions, and more information on safety concepts and the accident prevention hierarchy. It is available at http://www.safeopedia.com.

Stephans, R. *System Safety for the 21st Century*. Hoboken, NJ: John Wiley and Sons, 2004.

U.S. Fire Administration. *Developing Effective Standard Operating Procedures for Fire and EMS Departments*. Washington DC: Federal Emergency Management Agency, 1999.

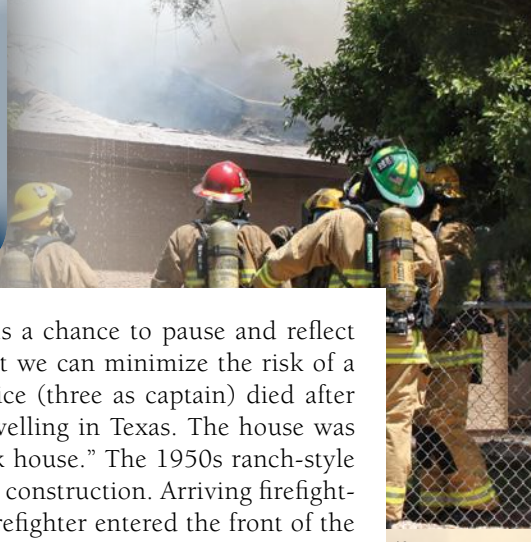
Endnotes

1 Duffy, Richard, and Chuck Soros. *The Safety Officer's Role*. Ashland, MA: Fire Department Safety Officers Association, 1994.

2 Final Report: Southwest Supermarket Fire, Incident #01-045301, Phoenix Fire Department. https://www.phoenix.gov/firesite/Documents/072604.pdf. Accessed April 29, 2015.

3 Federal Emergency Management Agency. *Risk Management Practices in the Fire Service, FA-166*. Emmitsburg, MD: U.S. Fire Administration, 1996.

INCIDENT SAFETY OFFICER *in action*



Smoke: © Greg Henry/ShutterStock, Inc.

The death of a fellow firefighter conducting fire suppression activities usually gives us a chance to pause and reflect on our own mortality. Most of us want to know the circumstances of the event so that we can minimize the risk of a similar occurrence. In February 2005, a fire captain with eleven years of career service (three as captain) died after being trapped by the partial collapse of the roof of a vacant one-story wood frame dwelling in Texas. The house was abandoned and in obvious disrepair. Area residents referred to the building as a "crack house." The 1950s ranch-style house was small and had two additions built onto the back of it sometime after its initial construction. Arriving firefighters reported fire venting through the roof at the rear of the house. The captain and a firefighter entered the front of the house as part of the initial attack. Visibility was reported to be good in the front of the house but changed quickly as they advanced toward the rear. The crew had just started applying water to the burning ceiling area near the rear of the house when the building addition roof collapsed, trapping the captain under burning debris. The collapse pushed fire toward the front of the house, which also ignited trapped smoke and sent a fireball rolling toward the front entrance. The fireball engulfed other crews that had entered the house, causing burn injuries to them. Immediate efforts to rescue the trapped captain proved difficult; he was pronounced dead at the scene.

The subsequent investigation involved several representative agencies. One of the agencies was the National Institute of Occupational Safety and Health (NIOSH). In their report, several recommendations were made to help minimize the risk of a reoccurrence:

- Ensure that the incident commander (IC) continuously evaluates risk versus gain when determining whether the fire suppression operation will be offensive or defensive.
- Train firefighters to communicate interior conditions to the IC as soon as possible and then provide regular updates.
- Use thermal imaging cameras (TICs) during the initial size-up and search phases of a fire.
- Ensure firefighters open ceilings and overhead concealed spaces as hose lines advance.
- Ensure that team continuity is maintained during fire suppression operations.
- Consider using exit locators such as high-intensity floodlights or flashing strobe lights to guide lost or disoriented firefighters to the exit.
- Train firefighters on the actions to take while waiting to be rescued if they become trapped or disoriented inside a burning structure.
- Consider developing and implementing a system to identify and mark dangerous and/or abandoned structures to improve firefighter safety.

Each of the recommendations should be viewed as preventive, not as a judgment on what did or did not happen in Texas. Given that consideration, each suggestion can be tied to a safety concept discussed in this chapter.

1. With the limited information available in this case, what specific indicators could have been used to help make risk versus gain judgments?
2. For each recommendation, which operational safety triad elements are at play? Why?
3. What is typically the most difficult factor to address regarding the "personnel" leg of the safety triad?
   - **A.** Attitude
   - **B.** Training
   - **C.** Education
   - **D.** Health
4. The hazard control countermeasures listed in the NIOSH recommendations most closely align with which mitigation strategy?
   - **A.** Elimination
   - **B.** Reduction
   - **C.** Adaptation
   - **D.** Avoidance

Note: This case study was excerpted from NIOSH report F2005-09. The complete NIOSH report is available at www.cdc.gov/NIOSH/fire.

Guiding Laws, Regulations, and Standards

CHAPTER 3

Knowledge Objectives

Upon completion of this chapter, you should be able to:

- Explain the motivation for the development of guiding publications. (p 30)
- List the significant players and their roles in developing guiding publications. (pp 31–32)
- Define the differences between regulations, codes, laws, and guides. (pp 31–33)
- State the technical and regulatory areas pertinent to emergency response within the incident command system. (NFPA 5.2.1, pp 33–34)
- List significant publications that can affect the incident safety officer. (pp 33–34)
- Identify applicable legislation, regulations, codes, and standards that identify levels of risk in fire department operations. (NFPA 5.2.2, pp 33–34)

Skills Objectives

There are no ISO skills objectives for this chapter.

You Are the Incident Safety Officer

A mound of resource and research documents are piling up on the desk and it seems your computer will soon run out of storage space to contain all of this information. You've identified many national, state, and local agencies that use different requirements and language in defining their safety compliance standards. You must gain a better understanding of these publications and determine which ones "trump" others.

1. Which agencies carry what levels of authority relating to the ISO position and the overall safety program you are establishing? Do the terminology or requirements of these agencies conflict with one another?
2. How can you use these agencies' regulations and standards to make your work consistent with national or state best practices for the ISO?

Introduction: The Reasons Behind the Rules

Where did all these rules come from? Before we answer this question, the point needs to be made that the fire service has very few rules compared to most other developed professions, trades, and crafts. It's true. Historically, fire departments have enjoyed the role of the "good guys." Mostly, firefighters have a reputation of being charitable, reliable, flexible, positive, and willing to do whatever it takes. They work with good intent. They are willing to risk their lives for a stranger. Each of these attributes has helped to protect the fire service from overly restrictive rules—and persecution in the court of law when an outcome was tragic. In fact, there are several legal principles that have a long history of minimizing fire department and firefighter liability, namely the principles of sovereign immunity and discretionary function.[1] Historically, the fire department existed to protect the community, and the community protected the fire department. Fire officers and firefighters who were caught misbehaving or doing something inappropriate (misdemeanor) were often dealt with behind closed doors or outright dismissed. It was rare to find a media source that published disparaging stories about firefighters and departments. Starting in the 1960s, rules began to be created, and by the 1990s, fire departments were asking, "Where did all these rules come from?" So what happened? Answering the question could take a few chapters, but we can slim the discussion down to three influencing factors that changed the fire service to a seemingly regulated profession:

1. An alarming rate of fires and other tragic events have claimed the lives of firefighters. The 1970s and early 1980s brought a rate of firefighter line-of-duty deaths (LODDs) that fire service leaders found unacceptable. Subsequent investigations and reports uncovered many cases of incident mishandling, and the loss of firefighters' lives was deemed preventable.
2. Fire departments' responsibilities have expanded to include emergency medical services (EMS) and hazardous materials response. Both of these functions carry high liability and a certain standard of care.
3. There has been a societal shift to hold public services accountable (litigation and demand for monetary compensation) for injuries, deaths, and suffering that occurred from the perceived mishandling of incidents.

Though the fire service may not be as highly regulated as the airline, heavy manufacturing, or food and drug industries, there is a growing need for incident safety officers (ISOs) to understand the many regulations, standards, and procedures that address incident operations. For the remainder of this chapter, we use the phrase "guiding publications" to refer to regulations, codes, laws, standards, and procedures.

One last point before we proceed. ISOs have been, and will most likely continue to be, named in criminal and civil court proceedings. When they are, the guiding publications become tools that help lawyers, judges, and juries weigh the circumstances and evidence presented. The ISO is wise to view the same publications as tools to avoid litigation and, more importantly, to help keep firefighters safe. The majority of the fire-service-specific publications and rules are written as a result of a tragic event; therefore, the ISO can use them as a basis to prevent similar tragedies from occurring. It is important to understand that fire officers have participated in the development of many guiding publications because they felt it was likely that a similar tragic event may occur in the future—and that probability was unacceptable. The ISO who understands this basic premise is on the path to making a difference.

The purpose of a guiding publication is better understood when the ISO knows which organization issued the publication and what factors typically motivate that organization. In other words, who are the "players"? Knowing the role of the Occupational Safety and Health Administration versus the role of the National Institute for Occupational Safety and Health is an example. These organizations exist for unique purposes and endorse various publications tailored to these purposes. This chapter looks at the roles of the players and the differences in the official publications. It also explores some of the more applicable publications from an ISO perspective.

Note: The information presented here is applicable to situations in the United States. Our firefighter friends in Canada, Mexico, and across the ocean may not find it as applicable, although similar systems probably exist with different names and authorities.

Safety Tip

Guiding Publications
The majority of fire service–specific standards and regulations are written as a result of a tragic event; therefore, the ISO can use them as a basis to prevent similar tragedies from occurring.

The Players

Knowing who the players are can help the ISO understand the breadth of publications and their effect at incidents to help prevent injury and death. Simply stated, hundreds—if not thousands—of established groups are involved in creating guiding publications. Fire service personnel routinely participate in these groups to help make these documents a usable prevention tool or to ensure that they are practical for incident handling. In some cases, the firefighters represent their own department; in others, the firefighters represent the voice of a trade organization or association. Let's look at some of the players that have a direct effect on incident operations FIGURE 3-1.

AGENCY	ROLE
NFPA	Development of national minimum consensus standards, codes, and guides. Also collects data and reports trends on a wide range of fire-related topics.
OSHA	Develop and enforce the Code of Federal Regulations (CFRs) dealing with occupational safety and health.
NIOSH	Research, investigate, and recommend safe procedures, processes, and habits.
DHS	Develop and implement a national response plan
EPA	Issue and enforce regulations and provide training for issues regarding hazardous materials and processes.

FIGURE 3-1 The significant fire service "players" and their roles.

- *Standards.* A developed body of work that gives minimum consensus direction for procedures, programs, equipment performance, and professional training and qualifications. Standards are written using *mandatory* language.
- *Guides.* A group of publications that NFPA calls *Recommended Practices*, which are written in a language that offers suggestions and in some cases options. Historically, many recommended practices go on to become standards.
- *Codes.* A complete work designed to be adopted as law by an authority having jurisdiction to do so. NFPA's *Life Safety Code* is the best known.

FIGURE 3-2 NFPA guiding publications: overview of NFPA standards, guides, and codes.

National Fire Protection Association (NFPA)

The NFPA was established in 1896 to address a multitude of fire prevention and fire protection issues. The NFPA is recognized for developing consensus standards, guides, and codes for a whole realm of fire-related topics FIGURE 3-2. These standards, guides, and codes are developed through committees who are appointed based on the needs of the fire service, private interests, and other technical specialties. Over time, the NFPA has also become a data collection resource for many fire-related issues, such as firefighter injury and death statistics, information on civilian fire deaths, and national fire and rescue incident trends. The NFPA also offers educational materials, training services, and investigative assistance. It is important to note that NFPA standards are often used to help define what is "acceptable" for fire service equipment, procedures, and professional qualifications. Additionally, NFPA standards could be—and have been—viewed by the courts as *common practice* or the *standard of care* when considering legal questions.

Occupational Safety and Health Administration (OSHA)

OSHA is part of the U.S. Department of Labor and is tasked with the creation and enforcement of workplace law. OSHA uses the Code of Federal Regulations (CFR) as the body of laws to improve workplace safety. Not all laws included in the CFR are enforceable for the public sector. Individual states adopt OSHA-approved *state plans*. Fire officers should contact their state department of labor to ascertain whether their public entity is covered by a state plan. Regardless, OSHA carries a pretty big stick when it comes to workplace safety: Federal OSHA, and where state labor authorities exist, can write citations and fine fire departments for noncompliance. In cases where a "willful disregard" is found, the fines can be extreme. OSHA also provides a great resource in addressing workplace safety issues through training programs, audits, and employee "right to know" literature and promotions.

National Institute for Occupational Safety and Health (NIOSH)

NIOSH is the safety and health research and educational arm of the federal government and is part of the Centers for Disease Control and Prevention (CDC) under the Department of Health and Human Services. In 1998, President Clinton directed—and congress funded—NIOSH to investigate all duty-related firefighter fatalities. This service is voluntary for the department that experienced the loss. NIOSH uses firefighter fatality investigations to help others prevent similar occurrences. These investigative reports can be found online through the CDC website (http://www.cdc.gov/niosh/fire). NIOSH has no enforcement responsibilities, but it can recommend the adjustment or creation of regulatory measures to OSHA. NIOSH has written several guides for specific hazards to help firefighters better prevent injuries and fatalities. Most are available for free download at the NIOSH website. A few notable examples include the following:

- *Preventing Injuries and Deaths of Fire Fighters due to Truss System Failures*

- *Preventing Deaths and Injuries of Fire Fighters Using Risk Management Principles at Structure Fires*
- *Preventing Deaths and Injuries to Fire Fighters During Live-Fire Training in Acquired Structures*

Department of Homeland Security (DHS)

Following the September 11, 2001, attack on the World Trade Center and the Pentagon, President George W. Bush authorized the creation of the DHS through the Homeland Security Act of 2002. The purpose of the act and the DHS's creation is to better prepare for, defend against, and respond to terrorist acts and other disasters within the United States. One of the first charges of the DHS was to develop a National Response Plan (NRP) to help manage catastrophic events that are beyond the capabilities of state and local agencies. The NRP title has since been changed to the National Response Framework (NRF). On February 28, 2003, President Bush issued the Homeland Security Presidential Directive (HSPD-5) that directed the DHS to develop and administer the National Incident Management System (NIMS) as part of the NRF. Federal grant money to fire departments is tied to their compliance with NIMS. Currently, the Federal Emergency Management Agency (FEMA) and the U.S. Fire Administration (USFA) fall under the cabinet-level DHS. Specifically, FEMA plays an important role in the response and recovery of natural and man-made disasters and is empowered to make judgements regarding cost-recovery for fire departments that have responded to the disaster. The USFA serves as an important resource for fire departments in that they collect data, develop safety-related training publications (and courses), and serve as the conduit to collect and approve various fire service–related federal grant requests.

Environmental Protection Agency (EPA)

The devastating results of hazardous materials (hazmat) release incidents (beginning generally in the 1970s) spurred the creation of the EPA to better prevent, respond to, and recover from hazmat incidents. The EPA has issued many regulations and offers support to fire departments for hazmat training. It also helps manage Superfund monies for cleanup and hazmat training. Even though some state fire agencies are not compelled to follow OSHA's CFR, they are required to follow EPA regulations.

National Institute of Standards and Technology (NIST)

Founded in 1901, NIST is a nonregulatory federal agency within the U.S. Department of Commerce. The mission of NIST is to promote innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance security and improvement in our quality of life. How does this make NIST a player in the fire service? One arm of NIST, the Fire Research Division, is a tremendous resource center that conducts testing and collects a vast amount of information on fire- and building-related subjects. The reports generated by NIST serve as an excellent source of training and education tools to help ISOs understand fire behavior in buildings. In recent years, NIST has joined with other agencies (Underwriters Laboratories, fire departments, and fire-related interest groups) to research and develop science-based solutions to fire behavior in the modern structural environment, which poses unprecedented challenges due to high heat release rates.

While far from inclusive, the preceding players are responsible for most of the guiding publications we talk about next. Remember that many fire service–oriented groups also figure in to the "player" group (see the *Fire Marks* box).

Fire Marks

Other Players in the Creation of Guiding Publications

It is important to note that many players are involved in addressing fire service issues—especially programs and publications designed to prevent firefighter deaths and injuries. Many of these groups are nonprofit, yet are intimately involved in the processes to create, alter, and implement guiding publications. It is an impressive list:

- International Association of Fire Fighters (IAFF)
- International Association of Fire Chiefs (IAFC)
- National Volunteer Fire Council (NVFC)
- National Fallen Firefighters Foundation (NFFF)
- Fire Department Safety Officers Association (FDSOA)
- International Society of Fire Service Instructors (ISFSI)

Defining the Terminology Used by Guiding Publications

There are thousands of publications that may have an effect on fire and emergency service personnel. It is important to understand not only the differences among these publications and their applicability, but also that all of them have a common goal: safety. At the street level, fire service personnel often throw around terms such as "codes" and "standards" interchangeably. Doing so may cause confusion and certainly misrepresents the specific applicability of each publication. Let's look at some of the intricacies of these publications' terminology.[2]

- *Laws.* A law is an enforceable rule of conduct that helps protect a society. From a legal perspective, laws are divided into *statutory law* and *case law.* A statutory law deals with rules of conduct in civil and criminal matters. Case law refers to a precedent established over time through the judicial process. As a hypothetical example, an incident commander (IC) is charged with criminally negligent homicide (statutory law) following a firefighter fatality. In the court proceedings, the IC may be found not guilty because of a precedent set by "*United States v. Gaubert*, 486 U.S. 315, 111 S. Ct. 1267, 1991 (case law), *which ruled* …."

  Although it may sound confusing, some jurisdictions use the term *code* for their statutory laws. Local research can help fire officers understand how their jurisdictions use the two terms.
- *Regulations.* A regulation typically outlines details and procedures that have the force of law issued by an executive government authority. The regulations included in OSHA's CFR and EPA regulations are examples.
- *Codes.* A code is a work of law established or adopted by a rule-making authority. Codes serve to regulate an approach, system, or topic for which they are written. The *Uniform Fire Code* and *Life Safety Code* are examples.

- *Standards.* NFPA standards are perhaps the most familiar to fire service personnel. The term standard can apply to any set of rules, procedures, or professional measurements that are established by an authority. To have the effect of law, a standard must be adopted by an authority with the legal responsibility to enact the standard as law (that is, promulgate it). For example, a city may enact a local ordinance that adopts a standard. In the case of NFPA standards, a formal consensus approach is used to develop the documents through representative technical committees, a standards council, and membership voting.
- *Guides.* A guide is a publication that offers procedures, directions, or standards of care as a reasonable means to address a condition or situation. Guides do not have the impact of a law, but they can be used in negligence cases to provide clarity on the general duty or standard of care. NIOSH has written several guides to address firefighter safety issues, and occasionally it issues an *alert*, which is another form of a guide. Alerts are issued in response to a disturbing trend of injuries or deaths by a specific cause (such as the failure of truss systems during structure fires) and typically describe case studies, technical research, and preventive measures. Textbooks (like this one) can also be considered guides and are often cited in investigations and legal proceedings to establish a standard of care.

Publications That Affect the Incident Safety Officer

Once you understand the roles of the players and guiding publications in emergency services, you can look at individual publications that may have a direct impact on firefighter safety. To cite them all here would take volumes; it is a compelling list. Instead, presented here are some of the more important documents that apply to incident handling and firefighter safety. The effective ISO will spend time researching the depth of these publications beyond what is offered here.

NFPA 1500: *Standard on Fire Department Occupational Safety and Health Program*

First published in 1987, the NFPA 1500 standard has become the "mother ship" of fire department safety and health because it ties together many other NFPA standards by referring to them by their applications. NFPA standards for professional qualifications, protective equipment, tools, apparatus, incident management, and training are all cited in the document. NFPA 1500 continues to evolve through the efforts of the Technical Committee made up of a diverse group of stakeholders. The current edition is divided into 14 chapters and an extensive annex section with explanatory information, checklists, and examples FIGURE 3-3.

Within NFPA 1500, Chapter 8 is essential information for any current fire officer and especially those who may be assigned the position of ISO. Of particular importance is the section on risk management during emergency operations. The section outlines a standard for risk levels that are considered acceptable while performing incident activities. The ISO is responsible for making sure the activities fall within these criteria (discussed in much greater depth in the *Reading Risk* chapter).

NFPA 1500 CHAPTER ORGANIZATION (2018 EDITION)

Chapter 1: Administration
Chapter 2: Referenced publications
Chapter 3: Definitions
Chapter 4: Fire department administration
Chapter 5: Training, education, and professional development
Chapter 6: Fire apparatus, equipment, and drivers/operators
Chapter 7: Protective clothing and protective equipment
Chapter 8: Emergency operations
Chapter 9: Traffic incident management
Chapter 10: Facility safety
Chapter 11: Medical and physical requirements
Chapter 12: Behavioral health and wellness programs
Chapter 13: Occupational exposure to atypically stressful events
Chapter 14: Exposure to fireground toxic contaminants
Annex A: Explanatory material
Annex B: Monitoring compliance with a fire service occupational safety, health and wellness program
Annex C: Building hazard assessment
Annex D: Risk management plan factors
Annex E: Hazardous materials ppe information
Annex F: Sample facility inspector checklists
Annex G: Informational references

FIGURE 3-3 NFPA 1500 chapter organization.

Of particular note to the ISO, NFPA 1500 addresses safety at the incident scene in Chapter 8, Emergency Operations. The chapter is broken into 11 areas:

1. Incident Management
2. Communications
3. Crew Resource Management (CRM)
4. Risk Management During Emergency Operations
5. Personnel Accountability During Emergency Operations
6. Members Operating at Emergency Incidents
7. Hazard Control Zones
8. Rapid Intervention for Rescue of Members
9. Rehabilitation During Emergency Operations
10. Scenes of Violence, Civil Unrest, or Terrorism
11. Post-Incident Analysis

NFPA 1521: *Standard for Fire Department Safety Officer Professional Qualifications*

In previous editions of NFPA 1521, the requirements, roles, responsibilities, functions, and authorities of an ISO and Health and Safety Officer (HSO) were outlined. It was "one-stop shopping." For many reasons, the 1521 document has shifted to that of a professional qualifications document, much like those for the firefighter and fire officer positions. The aforementioned requirements, responsibilities, functions, and authorities for the ISO have been moved to the NFPA 1561 standard (covered in the following NFPA 1561 section). The 1521 standard includes job performance requirements (JPRs) for the HSO and ISO. These JPRs outline a requirement by listing conditions and a desirable outcome followed by a list of requisite knowledge and skills objectives that support the topic. You may have noticed these JPRs and supporting knowledge and skills objectives cited at the start of the chapters in this text. ISO JPRs are included in Chapter 5 of NFPA 1521. The chapter is divided into seven areas:

- General statements

- General JPRs for all incidents
- JPRs for Fire Suppression Operations
- JPRs for Technical Search & Rescue Operations
- JPRs for HazMat Operations
- Accident Investigations and Review JPRs
- Post-Incident Analysis JPRs

One of the general statements is a requirement that the ISO meet the Fire Officer I JPRs that are specified in NFPA 1021, *Standard for Fire Officer Professional Qualifications*. The Fire Officer I requirement establishes a baseline and recognizes that the knowledge and skill set required of an ISO is much more analytical than those for a company officer. The 1521 standard also includes some useful annex material, including sample checklists and reports.

NFPA 1561: *Standard on Emergency Service Incident Management System and Command Safety*

In many ways, the real substance that establishes the ISO role is contained in the NFPA 1561 standard. While the entire standard defines and describes the essential elements of an incident management system (and those required by HSPD-5, *Management of Domestic Incidents*), Chapters 5 and 8 go into the specific requirements, functions, and authorities that pertain to the ISO. As mentioned previously, NFPA 1561 has already dropped the "I" from the ISO abbreviation in favor of the NIMS-preferred SO (safety officer). Some of the more important ISO elements are highlighted and paraphrased here:

- The fire department shall develop a policy to ensure that a separate SO responds automatically or is appointed to all working incidents.
- The IC shall appoint assistant safety officers (ASOs) when the size, scope, or technical complexity of an incident warrants doing so.
- Where utilized, the designated SO is a member of the command staff and reports directly to the IC.
- The SO shall have the authority of the IC to stop, alter, or suspend activities that present an imminent threat to firefighters. The SO must immediately inform the IC of any actions taken to correct the imminent threat.
- The SO has certain major responsibilities at all incidents (see the *Getting the Job Done* box).

Getting the Job Done

Major Responsibilities of the SO—NFPA 1561

- Participate in planning meetings.
- Identify hazardous situations associated with the incident.
- Review the incident action plan for safety implications.
- Exercise emergency authority to stop and prevent unsafe acts.
- Investigate accidents that occurred within the incident area.
- Assign assistants as necessary.
- Review and approve the medical plan.
- Maintain a unit log.
- The SO shall ensure that an incident rehabilitation area has been established.

OSHA Title 29 CFR

OSHA's primary focus area is in the private sector. Some regulations of the CFR, however, are intended to apply to the public sector as well. In some cases, the CFR specifically speaks to the rescue of employees engaged in certain activities (like confined space work). The series known as Title 29 CFR includes numerous subtitles that are specific to public sector members who engage in rescues and exposure to environments that are immediately dangerous to life and health (IDLH). The following entries of the Title 29 CFR may have some impact on the functions of the ISO:

- 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response Solutions*
- 29 CFR 1910.134, *Respiratory Protection*
- 29 CFR 1910.146, *Permit-Required Confined Spaces*
- 29 CFR 1910.147, *The Control of Hazardous Energy (Lockout/Tagout)*
- 29 CFR 1910.1030, *Blood-Borne Pathogens*
- 29 CFR 1910.1200, *Hazard Communication*
- 29 CFR 1910.1926, *Excavations, Trenching Operations*

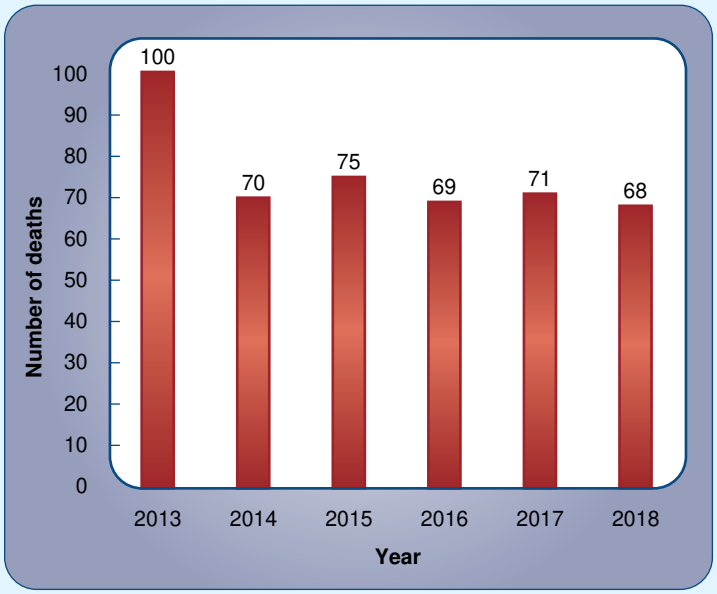
The regulations of the CFR that pertain to emergency response to incidents and rescues include specific language instructing that responders use NIMS for the command and control functions of the incident. As it relates to the ISO, the CFR emphasizes the need to have a written site safety plan for operations involving hazmat, confined spaces, trenches, and hazardous energy emergency incidents. When the fire department is engaged in rescue activities involving these elements, the ISO should develop a site safety plan (in writing) and present a safety briefing to those working the incident. The development of safety plans and briefings is discussed in later chapters.

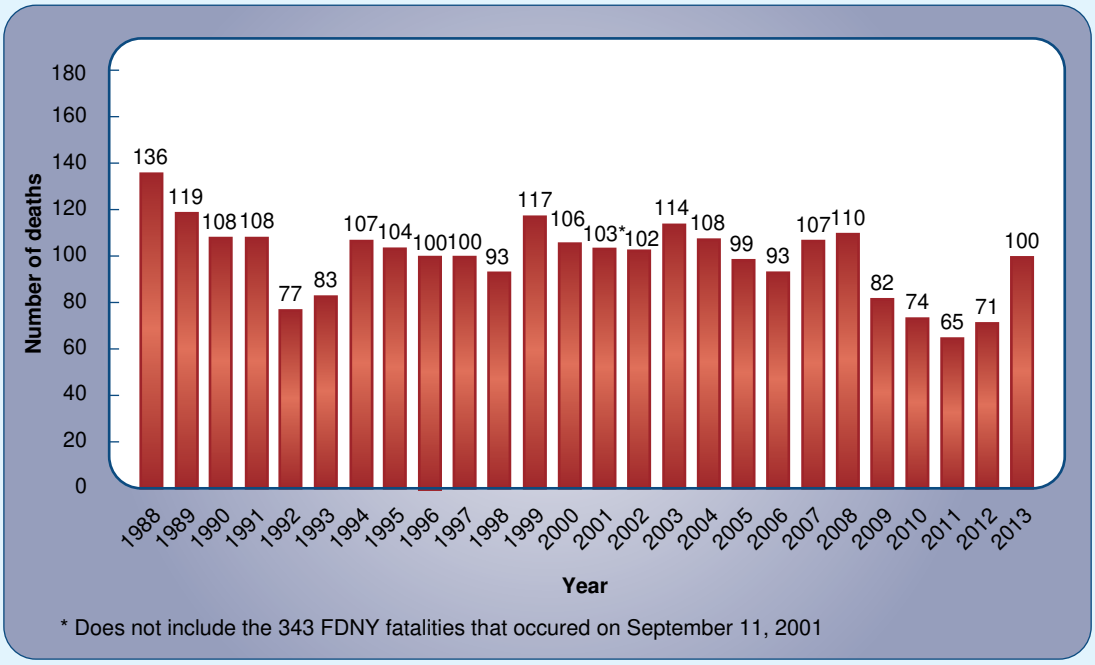
National Fallen Firefighter Foundation—16 Firefighter Life Safety Initiatives

The National Fallen Firefighters Foundation (NFFF) hosted a first-of-its-kind Firefighter Life Safety Summit on March 10–11, 2004, in Tampa, Florida. The summit, consisting of more than 200 fire and emergency service representatives from more than 100 organizations and departments nationwide, was convened to support the USFA's stated goal of reducing firefighter fatalities by 25% within 5 years and 50% within 10 years. After the event, the NFFF and the USFA released a report that details 16 initiatives and recommendations for drastically reducing firefighter fatalities and injuries (see the *Fire Marks* box).

It is clear that the goal of LODD reduction has not been made even though significant efforts have been made by many departments and organizations TABLE 3-1. The NFFF and USFA have hosted several follow-up summits to revisit the initiatives. The focus of these follow-ups has been to define some of the underlying human behaviors that are delaying the goal

TABLE 3-1 LODD Statistics, 1988–2018.





Modified with permission from NFPA's report, "Firefighter Fatalities in the United States-2103" by Fahy, Rita F. © 2013, National Fire Protection Association.

Fire Marks

The NFFF 16 Firefighter Life Safety Initiatives

1. Define and advocate the need for a cultural change within the fire service relating to safety, incorporating leadership, management, supervision, accountability, and personal responsibility.
2. Enhance the personal and organizational accountability for health and safety throughout the fire service.
3. Focus greater attention on the integration of risk management with incident management at all levels, including strategic, tactical, and planning responsibilities.
4. All firefighters must be empowered to stop unsafe practices.
5. Develop and implement national standards for training, qualifications, and certification (including regular recer-

Continues

Fire Marks (*Continued*)

tification) that are equally applicable to all firefighters based on the duties they are expected to perform.
6. Develop and implement national medical and physical fitness standards that are equally applicable to all firefighters, based on the duties they are expected to perform.
7. Create a national research agenda and data collection system that relates to the initiatives.
8. Use available technology wherever it can produce higher levels of health and safety.
9. Thoroughly investigate all firefighter fatalities, injuries, and near misses.
10. Grant programs should support the implementation of safe practices and/or mandate safe practices as an eligibility requirement.
11. National standards for emergency response policies and procedures should be developed and championed.
12. National protocols for response to violent incidents should be developed and championed.
13. Firefighters and their families must have access to counseling and psychological support.
14. Public education must receive more resources and be championed as a critical fire and life safety program.
15. Advocacy must be strengthened for the enforcement of codes and the installation of home fire sprinklers.
16. Safety must be a primary consideration in the design of apparatus and equipment.

Wrap-Up

of a significant reduction of LODDs. The reports from these meetings are forthcoming. Until then, it's important for ISOs to know the 16 initiatives and help champion the effort in their own departments and sphere of influence.

Chief Concepts

- Starting in the late 1960s, the fire service has seen a dramatic increase in the number of laws, regulations, and standards (guiding rules and publications) that impact the fire service. The majority of these rules are a direct result of a tragic occurrence. In many cases, the tragedy resulted from incident mishandling and the loss of lives was deemed preventable.
- Guiding publications become tools that help lawyers, judges, and juries weigh the circumstances and evidence presented. The ISO is wise to view the same publications as tools to avoid litigation and, more importantly, help keep firefighters safe.
- Fire service personnel routinely participate in the development of guiding publications. Some represent their own department and others represent the voice of a trade organization or association.
- Some of the leading players in the development of guiding publications include the NFPA, OSHA, the EPA, NIOSH, the DHS, NIST, and several trade associations such as the IAFC, IAFF, and FDSOA.
- Defining various regulations, codes, and standards is not always easy. Fire officers are encouraged to consult their local jurisdiction's legal administrators to help understand the definition and applicability of each. As a starting place, some general definitions can help:
  - *Laws* are rules of conduct that help protect a society. From a legal perspective, laws are divided into *statutory laws* and *case laws*.
  - *Regulations* outline procedures that have the force of law issued by an executive government authority.
  - *Codes* are bodies of work established or adopted by a law-making authority.
  - *Standards* are any set of rules, procedures, or professional measurements that are established by an authority. To have the effect of law, a standard must be promulgated by an authority with the legal standing to do so.
  - *Guides* are publications that offer procedures, directions, or standards of care to address a condition or situation. Guides do not have the impact of a law but can be used in cases of negligence to provide evidence of general duty or standard of care.
- NFPA 1500 is a mother-ship document that outlines the requirements for an occupational safety and health program for the fire service. Chapter 8 addresses emergency

scene operations and identifies the levels of risk-taking that are considered acceptable.

- NFPA 1521 is now a professional qualifications standard containing job performance requirements (JPRs) for HSOs and ISOs. The standard also requires that ISOs meet the qualifications of a Fire Officer I as defined in NFPA 1021.
- NFPA 1561 is the incident management standard that establishes the requirement, responsibilities, and functions of the SO position. It requires that fire departments create a policy to ensure that a separate SO, independent of the incident commander (IC), responds automatically to working incidents. Further, the document requires that the SO be a command staff position that reports directly to the IC.
- According to several regulations of OSHA's CFR, an ISO must be appointed at certain emergency response events (hazmat, confined space, and technical rescue) and is responsible for the development of a formal safety plan and safety briefings for responders.
- The National Fallen Firefighters Foundation published 16 Firefighter Life Safety Initiatives in 2004 to help reduce the number of line-of-duty deaths (LODDs) by 50% in 10 years. Although the goal has not been met, all firefighters need to take ownership in their respective departments to keep the initiatives in focus and work toward the goal.

Key Terms

case law A precedent established over time through the judicial process.

code A work of law established or adopted by a rule-making authority. It serves to regulate an approach, system, or topic for which it is written.

guide A publication that offers procedures, directions, or standards of care as a reasonable means to address a condition or situation.

law An enforceable rule of conduct that helps protect a society. From a legal perspective, laws are divided into *statutory laws* and *case laws*.

regulation A rule, issued by an executive government authority, that outlines details and procedures that have the force of law.

standard A rule, procedure, or professional measurement established by an authority. To have the effect of law, it must be adopted by an authority with the legal responsibility to enact the standard as law (that is, promulgate it).

statutory law A rule of conduct in civil and criminal matters.

Review Questions

1. What has typically motivated the establishment of guiding publications?
2. How are OSHA and NIOSH different?
3. What is the significance of the U.S. Department of Homeland Security to the fire service?
4. Define regulations, codes, laws, and guides.
5. List the 11 topical areas in the NFPA 1500 chapter on emergency operations.
6. What does IDLH stand for?
7. What responsibility does the ISO have in the use of OSHA's Title 29 CFR?
8. Where can the ISO find the consensus acceptable risk management levels for incident operations?

References and Additional Resources

Callahan, Timothy. *Fire Service and the Law.* 2nd ed. Quincy, MA: National Fire Protection Association, 1987.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program.* Quincy, MA: National Fire Protection Association, 2018.

NFPA 1521, *Standard on Fire Department Safety Officer Professional Qualifications*. Quincy, MA: National Fire Protection Association, 2020.

The National Institute for Occupational Safety and Health (NIOSH) website is available at http://www.cdc.gov/niosh.

The National Institute of Standards and Technology (NIST) website is available at http://www.nist.gov.

The Occupational Safety and Health Administration (OSHA) website is available at http://www.osha.gov.

Endnotes

1 Callahan, Timothy. *Fire Service and the Law.* 2nd ed. Quincy, MA: National Fire Protection Association, 1987.

2 Author's note: A special thanks to attorney and Fire Chief David Comstock, Jr., Western Reserve Joint Fire District, Poland, Ohio, for his assistance in the development and review of this material.

INCIDENT SAFETY OFFICER *in action*

Smoke: © Greg Henry/ShutterStock, Inc.

On September 25, 2001, Firefighter Trainee Bradley Golden died during a live-fire training exercise in Lairdsville, New York. Assistant Chief Alan G. Baird III, the designated instructor for the training exercise, was charged with second-degree manslaughter and later found guilty of criminally negligent homicide by an 11-person jury.

The case against Baird arose out of a live-fire rapid intervention exercise during which Golden and another firefighter posed as victims. Golden, who had been a volunteer firefighter for only a few weeks, had never had any formal training, and had never worn an SCBA in a live-fire environment. Despite this, Golden and another firefighter were placed in the second-floor front bedroom of a residential duplex and covered with debris to simulate entrapment. A burn barrel was ignited on the second floor to develop smoke, and shortly thereafter, Baird ignited a foam mattress on the first floor. Within minutes of the mattress ignition, flames rolled across the ceiling, up the stairway, and out the windows of the front bedroom where the simulated victims were. No hose lines had been stretched prior to the ignition of the fires. A total of three firefighters were trapped on the second floor with limited egress options. One firefighter self-extricated by prying open a boarded-up window and the others were removed from the building by crews that had been staged for the drill. Golden was found unresponsive and was transported to the hospital, where he was pronounced dead. The other two firefighters suffered burns and were airlifted to the hospital.

In his defense, Baird testified that he was not the officer in charge and that the incident commander and designated safety officer were aware of the drill objectives and knew what fires were to be set. Baird pointed out that he was not the highest-ranking officer on scene. Baird also testified that at the time of the exercise he was not aware of the NFPA standards that address live-fire training. Additionally, Baird testified that the training was being accomplished following procedures that they used at a previous live-fire training event several years earlier that was under the direction of a state fire inspector. Baird's counsel argued that Baird should not be held accountable for not knowing about the NFPA standards and that he should have never been charged because the tragedy was an "accident." Prosecutors cited NFPA 1403, *Standard for Live Fire Training* in their arguments and ultimately convinced the jury that Baird violated many nationally known standards.

1. What role do NFPA standards play in the defense and prosecution of fire officers in criminal matters or in the judgment of civil cases?
2. What accountability do the incident commander and safety officer have in similar situations?
3. The legal precedent established above in *People of the State of New York v. Alan G. Baird III* is an example of which kind of guiding publication?
   - **A.** OSHA CFR
   - **B.** Case law
   - **C.** Statutory law
   - **D.** Promulgated code
4. In addition to criminal and civil lawsuits, a fire department can be levied fines for noncompliance with recognized safety practices. Which agency has a responsibility to write citations to help enforce safe practices?
   - **A.** NFPA
   - **B.** NIOSH
   - **C.** NIST
   - **D.** OSHA

Designing an Incident Safety Officer System

CHAPTER

4

Flames: © Ken LaBelle NRIFirePhotos.com

Knowledge Objectives

Upon completion of this chapter, you should be able to:

- Discuss the reasoning for preplanning the response of an incident safety officer (ISO). (pp 40–42)
- List six examples of when an automatic ISO response should take place. (pp 43–44)
- List seven examples of when an incident commander should automatically delegate the safety responsibility to an ISO. (pp 44–45)
- List and discuss the advantages and disadvantages of using various methods to ensure that an ISO arrives on scene. (pp 45–47)
- Discuss issues relating to the ISO's authority, as defined by NFPA standards. (p 47)
- List several tools that will help the ISO be effective on scene. (pp 48–49)

Skills Objectives

There are no ISO skills objectives in this chapter.

You Are the Incident Safety Officer

The first drafts of your organizational documents are due very soon. You have a vision of how the incident safety officer (ISO) position will be established and want to create a front-loaded and proactive response. You believe that a preplanned response is necessary to prevent injuries and to assist in overall accountability for the requirements you have identified in your research.

1. What minimum qualifications for persons assigned as an ISO have you identified in your research of the position in the governing documents?
2. In addition to the requirements established by the various standards and regulations, what skills and knowledge bases should a qualified ISO possess? Which of these areas are your individual strengths and weaknesses?

Introduction: Making an ISO System Work

The design and implementation of a fire department incident safety officer (ISO) program or system can make the difference in whether or not a program will be effective. When the first edition of this text came out, many fire departments took suggestions from it to help make their ISO system work. Since then, departments have discovered through trial and error ways to maximize the effectiveness of their ISO program. The options now available for designing an ISO system are numerous—and endless—involving such dynamics as fire department size, deployment strategy, and unique needs. Nevertheless, the design of the ISO program should address some major questions, such as:

- Who responds and fills the ISO role?
- What types of incidents necessitate the use of an ISO?
- What tools and training are necessary to maximize ISO effectiveness?

When designing a system, it is important to keep in mind the requirements for the appointment of an ISO from NFPA 1561. Key requirements are listed below. In this chapter, we explore the rationale for the NFPA requirements as well as suggestions on how to design an ISO system.

Incident Management System Requirements for a Safety Officer

NFPA 1561, *Standard on Emergency Service Organization Incident Management System and Command Safety*, outlines several key points pertaining to the use of safety officers within the incident management system, including the following:

- SOPs shall define criteria for the response or appointment of a safety officer. The safety officer shall be appointed as early in an incident as possible.
- A policy shall exist for the appointment of a safety officer and to ensure that a separate safety officer (independent from the incident commander) responds automatically to predesignated incidents.
- If a predesignated SO is not available, the incident commander shall appoint a qualified member to fill the SO role.
- An additional assistant safety officer(s) shall be appointed when the activities, size, or need of the incident warrants extra safety personnel.
- The safety officer shall be integrated within the incident management system as a command staff member.
- The SO has authority to stop, alter, or suspend activities that present an imminent threat of harm.
- The SO and ASO(s) shall be readily identifiable at the incident scene.

Proactive ISO Response

Most incident commanders (ICs), fire chiefs, and firefighters would agree that ISOs are necessary and valuable at significant or complex incidents. However, the discovery that an incident is significant or complex typically comes after incident operations are under way and the incident management system has been set up. This leads to a situation in which the delegation of an ISO is *reactive*. For example, an emergency call is received and a programmed response is initiated. Once on scene, the incident command system is implemented and actions are taken to begin mitigation. If the incident is significant or overcomes the initial response, additional resources are requested. At about this time, the IC realizes that his or her responsibility for the safety of all responders requires more attention and that a separate ISO can help. In this case, the IC is reactive in the delegation of firefighter safety duties. For an IC to truly make a difference at an incident scene, the delegation of the safety function to an ISO needs to be *proactive*. To be proactive in the delegation and placement of an ISO, the fire department needs to *preplan* the ISO response.

Before we delve into the means of developing an effective ISO system (i.e., the *when*, *where*, and *how*), let's take a moment to more fully consider *why* departments need to preplan an ISO response.

Why Preplan the ISO Response?

A few ICs believe that any fire officer should be able to fill the ISO position, at any time, under any circumstance, at the will and demand of the IC; therefore, the agency really doesn't need to create an ISO system. Not only is this thinking flawed, it is dangerous. Just as ICs have various levels of knowledge and expertise, so do other fire officers. Likewise, the requirements to be a fire officer may change from department to department—a problem if the need for mutual aid arises. Further, the emphasis placed on safety may vary from one IC to another. Firefighter death and injury statistics suggest that more can be done to improve firefighter safety (as stated in the chapter *The Safety Officer Role*). Those same statistics show that the majority of deaths and injuries on the fire ground occur at residential structure fires. Logic (as opposed to traditional fire ground thinking) suggests that we send an ISO to all residential fires. However, we know that some ICs are thinking, "Residential fire, a couple engines, a dozen people—we can handle that. We don't need a safety officer." The statistics show otherwise. Simply stated:

> *The ISO is most effective when he or she arrives early in the incident.*

The National Institute for Occupational Safety and Health (NIOSH), through its line-of-duty death (LODD) investigation and prevention program, has repeated this recommendation in numerous cases. A few pragmatic graphs, based on a typical residential working fire, can further illustrate the need to have an ISO assigned early at fires.

Graph 1: Environmental Change

As applied to a residential structure fire, "environmental change" means fire propagation, building degradation, and smoke volatility. As shown in FIGURE 4-1, the rate of change is measured and rated over time. During a fire in a structure, there is actually a routine, or even a rapid, rate of change upon arrival of fire crews.

Granted, the environment encountered by fire personnel depends on response time. In most cases, the fire is intensifying upon arrival (that's probably why someone called 9-1-1). At arrival (zero on the time line), the fire is starting to develop significantly. With that comes smoke production as more contents (fuel) become heated. Equally, the building itself is being attacked and thus becoming structurally degraded—especially in lightweight structures. If flashover happens prior to fire department control efforts, the environmental change becomes ultra-rapid. Other events can cause ultra-rapid change: smoke explosions, backdrafts, partial collapse, the presence of accelerant fuels, and other phenomena. Once control efforts have begun, the rate of change can be stabilized and even reduced. It would seem to make sense to have an ISO on hand early to help evaluate hazards during these periods of rapid and ultra-rapid change.

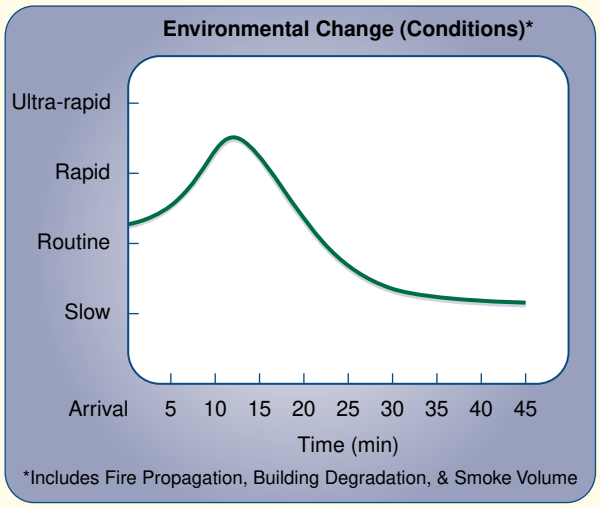


FIGURE 4-1 The rapid rate of change during the early stages of a residential structure fire supports the argument for proactive ISO response and assignment.

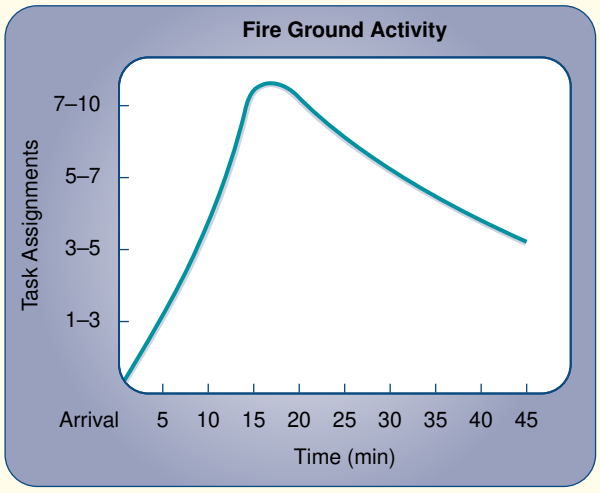


FIGURE 4-2 The higher the number of task assignments, the greater the need for an ISO.

Graph 2: Fire Ground Activity

At a scene with lots of fire ground activity, early ISO assignment is highly advantageous. Upon arrival at a typical residential fire, you can argue that no tasks are being performed FIGURE 4-2. Even though all responders are going through their personal size-ups and potential ICs are performing a lot of mental evaluations, no crews are performing physical, active tasks in the dangerous environment upon arrival. As on-scene time passes, the activities needed to control the incident increase: Perhaps one to three tasks are being accomplished based on the number of resources that arrive initially. Within 20 minutes, the IC may be orchestrating 7 to 10 simultaneous assignments, which may include search and rescue, exposure protection, flow path management, preparing attack and backup lines, rapid intervention planning, etc. For some departments, the simple task