THIRD EDITION

Principles of Fire Prevention

David Diamantes

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CHAPTER 1

The Basis for Fire Prevention

LEARNING OBJECTIVES

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

- Discuss the fire problem in the United States and give reasons for its existence.
- Contrast the fire record of the United States with the records of other countries.
- Name organizations that have been instrumental in our nation's fire prevention efforts.
- Discuss the effect that timing has on the adoption and enforcement of fire prevention regulations.

Case Study

On December 11, 1995, an explosion and fire at Malden Mills in Methuen, Massachusetts, injured 37 workers, devastating the manufacturer of synthetic fleece clothing marketed under the Polartec brand. Polartec was distributed by Patagonia, The North Face, Marmot, Cabela's, Lands' End, LL Bean, and used extensively by the U.S. Military. Originally reported as a boiler explosion, the Occupational Safety and Health Administration, the U.S. Fire Administration, and the Massachusetts State Fire Marshal's Office attributed the fire to a dust explosion involving nylon fleece fibers. While reports of previous events at the same facility indicated that nylon fibers were ignited by static electricity, managers and employees did not generally understand that the fibers were an explosion hazard before the 1995 fire. The National Fire Protection Association (NFPA) determined it was the 17th largest loss fire in U.S. history, a $752 million loss (adjusted for inflation).

Malden Mills owner Aaron Feuerstein became a celebrity for paying his workers for months, even though there was no work to do. He proceeded to rebuild the mill and rehired most of his 2,700 employees by the time it reopened about 2 years later. During a time when other companies were downsizing, Mr. Feuerstein especially stood out for his dedication to the welfare of his employees.

Unfortunately the down time between the fire and reopening allowed competitors to gain a business advantage. Malden Mills filed for bankruptcy in 2001 and again in 2007. The assets of the company were liquidated in 2007, and the underfunded pension plan for 1,500 employees and retirees was taken over by the Pension Benefit Guarantee Corporation. Malden Mills went from the largest employer in the region to a soon-forgotten memory.

1. Given the severity of the fire and its impact on the region, how could it have affected fire prevention programs in Massachusetts and across the nation?
2. What actions could have been taken to prevent the 1995 explosion?
3. Did the fire department have any responsibility to educate the plant operators about the dangers of static electricity and combustible fibers?

Information for this case study came from: *Manufacturing Mill Fire Methuen, MA, USFA-TR-110*, December 1995, Department of Homeland Security, Washington, DC; Amy Beasley Spencer, "Dust Explosions," *NFPA Journal*, November/December, 2008.

Introduction

A look back at efforts to prevent the occurrence of hostile fires and reduce the impact of those that start reveals patterns of reaction followed by inaction. In the aftermath of a catastrophic fire, elected officials may feel the need to act, and a law or several laws are often passed. Over time, adherence to the law becomes inconvenient or burdensome, and people tend to forget the incident that led to the law's passing. People commonly believe that fire is a remote possibility—an event that usually happens to someone else. However, history suggests that this view is likely naïve.

Fire is not the only thing we tend to believe only happens to someone else. Within a month of the September 11, 2001 terrorist attacks on New York City and the Pentagon, airline passengers being interviewed by the news media in airports were complaining about the unnecessary inconvenience posed by increased security measures. Memories fade with the passage of time.

The political process tends to be better at dealing with the "now" or the "just happened" than with the future, and overall has not been particularly effective in addressing our national fire problem throughout our nation's 200-plus-year history. Many of our fire

prevention successes have been the result of forces outside the political process acting in their own self-interests. In many cases, their successes have benefited the entire country. The insurance industry is the most prominent example of a nongovernmental entity that has had a significant impact on fire prevention through the development of regulations.

The American Fire Problem

Our national fire record has historically been one of the worst in the Western world. The 2001 edition of the U.S. Fire Administration's (USFA's) *Fire in the United States* summarizes the problem in stark language:

> Fire Departments respond to an average of 2 million fire calls each year. This fire problem, on a per capita basis, is one of the worst in the industrial world. Thousands of Americans die each year, tens of thousands of people are injured, and property losses reach billions of dollars. There are huge indirect costs of fire as well—temporary lodging, lost business, medical expenses, psychological damage, pets killed, and others. To put this in context, the annual losses from floods, hurricanes, tornadoes, earthquakes, and other natural disasters combined in the United States average just a fraction of the losses from fires. The public, the media, and local governments, are generally unaware of the magnitude and seriousness of the fire problem to individuals and their families, to communities, and to the nation.
>
> Reproduced from: *Fire in the United States,* 12th ed. (Emmitsburg, MD: United States Fire Administration, National Fire Data Center, August 2001), page 1.

Unfortunately, almost every report or study of fire protection in U.S. history contains a nearly identical summary.

Tip

The United States' fire record has historically been one of the worst in the Western world.

Government Response

In 1971, President Richard Nixon appointed 24 individuals to the National Commission on Fire Prevention and Control. The commission's original report, titled *America Burning*, was released in 1973 and was a significant milestone for fire prevention and protection in the latter half of the 20th century. The report concluded: "The richest and most technologically advanced nation leads all the major industrialized countries in per capita deaths and property loss from fire."[1]

In May 2000, *America at Risk,* the report of a "recommissioned" *America Burning* panel, was submitted to the director of the Federal Emergency Management Agency. The commission reported on the nation's progress since the original *America Burning* report in 1973:

> The frequency and severity of fires in America do not result from a lack of knowledge of the causes, means of prevention or methods of suppression. We have a fire "problem" because our nation has failed to adequately apply and fund known loss reduction strategies.
>
> Reproduced from: *America at Risk* (Emmitsburg, MD: Recommissioned Panel for America Burning, Federal Emergency Management Agency, May 2000), page 15.

The Current Trend

The most recent edition of *Fire in the United States* highlights our national success in reducing the number of fatalities and injuries:

> Annual deaths from fire in the United States were estimated at 12,000 in 1974, the year in which the USFA was established. At that time a goal was set for reducing this number by half within a generation. This goal was met and, in 2002, civilian deaths were at their lowest level (3,380) since 1974.
>
> Reproduced from: *Fire in the United States,* 14th ed. (Emmitsburg, MD: United States Fire Administration, National Fire Data Center, August 2007), page 2.

A look at U.S. fire losses in 2004 and the 10-year trend reveals significant declines, with fires and fire

Table 1-1 Fire and Fire Loss Rates

Loss Measure	2004	10-Year Trend (percentage)
Fires/Million Population	5,280	–27.7
Deaths/Million Population	13.3	–28.9
Injuries/Million Population	60.9	–39.6
Dollar/Capita*	$33.4	–6.2

* The NFPA estimates fire deaths to be 3,900 in 2004. Analysis of National Center for Health Statistics (NCHS) mortality data suggests that fire deaths were 3,993. The per-capita rate used throughout *Fire in the United States* reflects the number of fire deaths (3,993) from NCHS mortality analyses.

Reproduced from: *Fire in the United States,* 14th ed. (Emmitsburg, MD: United States Fire Administration, National Fire Data Center, August 2007), page 2.

injuries per million population reaching 10-year lows Table 1-1. The 2004 per-capita death rate was about half of what it was in the late 1970s.

Statistics from the National Fire Protection Association reveal a continued downward trend in the number of fires and the number of injuries and fatalities from fire Table 1-2. Note that direct dollar loss from fire is either static or continues to increase. Indirect loss, particularly business interruption, which may result in plant and factory shutdowns, layoffs, and sometimes permanent closures or relocations, is often difficult to completely quantify but can be significantly higher.

In spite of these successes, the United States' fire death rate is more than double that of several European countries and at least 20 percent higher than that of many others. Of the 25 industrial nations examined by the World Fire Statistics Centre, the United States ranked as having the fourth highest fire death rate. This general status has been unchanged for the past 25 years.[2]

The History of Fire and Fire Prevention

Fire in the Early Days

Evidence from anthropological excavations indicates that humans used fire for heat and light sometime around 500,000 BC.[3] Animal bones and

Table 1-2 Fire Loss in the United States: 2003–2012

Year	Fires	Deaths	Injuries	Direct Dollar Loss
2003	1,584,500	3,925	18,125	12.3 billion[a]
2004	1,550,500	3,900	17,875	9.8 billion
2005	1,602,000	3,675	17,925	10.7 billion
2006	1,642,500	3,245	16,400	11.3 billion
2007	1,557,500	3,430	17,675	14.6 billion
2008	1,451,500	3,320	16,705	15.5 billion[b]
2009	1,348,500	3,010	17.050	12.5 billion
2010	1,331,500	3,120	17,720	11.6 billion
2011	1,389,500	3,005	17,500	11.7 billion
2012	1,375,000	2,855	16,500	12.4 billion

[a] Includes the 2003 Southern California wildfires, with an estimated property loss of $2 billion.

[b] Includes the 2008 California wildfires, with an estimated property loss of $1.4 billion.

Data from: NFPA's "Fire Loss in the United States" for the years 2003 through 2012, http://www.nfpa.org/research/reports-and-statistics/fires-in-the-us/overall-fire-problem/fire-loss-in-the-united-states

charred wood have been found dating to this era, indicating that humans had "captured" fire for their use, probably transferring burning embers from the site of naturally occurring fires to their camps. The ability to capture fire enabled early humans to range farther from the more temperate areas of the Earth, opening up new territory for our hunter–gatherer ancestors. New territory meant more game and edible plants and less competition from other humans.

Sometime later, humans developed methods of creating fire through friction, enabling them to start fires at will, again increasing their range and ability to cope with climactic conditions. Anyone who has tried to start a fire with flint and steel or a wooden bow understands the skill and patience involved in primitive fire making. Fire enabled humans to fire pottery; smelt copper and tin; and, finally, make iron. Harnessing the power of fire was a milestone in our evolution from creatures that roamed the savannahs in fear of larger predator animals to inhabitants of modern civilization.

Even in the earliest of times, there must have been cases in which fire escaped its captors with terrible results. Hostile fires must have erupted within the shelters of early humans, destroying the shelter and their tools, foodstuffs, clothing, and even primitive weapons that provided the only protection from animal predators. In 500,000 BC, our ancestors could not call the Red Cross for disaster relief—they either starved or froze. The impact of hostile fires on prehistoric civilization as a whole was probably insignificant because tribes or families were small and traveled in bands. There were no cities or towns to burn down. There were no cultural landmarks or large industries to lose.

Things changed when people began to live in close proximity, form cities and societies, and create governments. With the formation of civilization came commerce and trade, and fire became a necessary tool for heat, light, cooking, and industry. Consequently, new methods of creating fire were developed. The lowly match may have been one of the greatest technological inventions in history. Suddenly, fire could be created with the flick of the wrist.

Technological Progress in Making Fire

Matches are reported to have existed since the time of the Roman Empire, but they were not self-igniting and required heat in order to light.[4] Early friction matches were first made available to the public in the early 1800s and were sold under such prophetic names as "Lucifers" and "Congreves." (Sir William Congreve was the Englishman who invented the military rocket in 1805. It was the "red glare" of Congreve's rockets during the siege of Fort McHenry by the British fleet during the War of 1812 that inspired Francis Scott Key to write the famous words of our national anthem.[5]) As new technologies for fire starting developed, the friction match was replaced by the safety match. However, something else new had developed: when fire escaped from its harness, instead of destroying the campsite and a handful of hapless members of a family, fire could destroy a town or a city. Fire could even be used as a weapon against other cities. Just as today, in the aftermath of fire disasters, society attempted to prevent their recurrence.

Fire Prevention in the Early Days

300 BC

The first recorded attempts at fire prevention and protection took place in Rome in about 300 BC. Slaves were organized into a combination night watch and firefighting force called the Familia Publica. In about 24 BC, the Roman Emperor Augustus instituted perhaps the first municipal fire department, the Corps of Vigiles, which performed fire patrol and fire-extinguishing duties, with members assigned to specific functions such as water supply or pump operation. Roman law assigned the responsibility for determining cause and origin of a fire to a municipal official akin to a modern fire marshal, permitting corporal punishment for those involved in the ignition of accidental fires and directing the official to deliver "incendiaries," or those involved in the crime of arson, to the Prefect of the City for prosecution.[6]

AD 1000

Early attempts at preventing fire by regulating public behavior can be traced to England, where the nation's first curfew can be traced to the city of Oxford in

AD 872. In 1066, William the Conqueror decreed that all home fires were to be extinguished and covered every evening at a time signaled by the ringing of a bell. The metal cover used to cover the hearth was called a *couvre feu*, or fire cover. Over time, the term has been changed to "curfew" and has come to mean a time at which persons are to be home and off the streets. In his *Evolution of the Fire Service*, B. J. Thompson remarks that William the Conqueror's *couvre feu* might not have been that far removed from the intent of today's curfew because without the light from the hearth fires throughout his kingdom, it would have been difficult for his subjects to plot a revolt.[7]

AD 1500

In the 1500s, English cities passed ordinances regulating bakers and candle makers, two hazardous trades that involved the use of fire in the close quarters that were the early cities. Laws were also enacted that regulated or prohibited wooden chimneys and thatched roofs and that even mandated brick or stone firewalls between buildings. All had differing levels of success, depending on the willingness or indifference of the public and governing officials.

AD 1666

The Great Fire of London occurred in 1666, following on the heels of the bubonic plague or "Black Death." In an average year at the time, around 17,000 people died in the city of London.[8] However, in 1665, the year preceding the fire, deaths in London attributed to the bubonic plague exceeded 68,000. The fire, which originated in kindling stored near the oven of King Charles's baker,[9] burned for 5 days and nights, destroying 13,200 homes, 87 churches, Saint Paul's Cathedral, 20 warehouses, and 100,000 boats and barges.[10] Nevertheless, it took 2 years for Parliament to enact the London Building Act, and commissioners were not appointed to enforce the regulations for another 108 years, in 1774.[11] In the aftermath of the Great Fire of London, a physician named Nicholas Barbon, one of the few who had not fled the city during the plague, formed a group for the insurance of buildings against fire. Shipping insurance had been in existence for some time in England, but property insurance had not. Barbon's effort grew into the London Fire Office, which later led to the formation of a fire brigade to extinguish fires in insured properties, the precursor to the modern fire service.

Fire in American History

Has modern America developed an indifference to fire in our third century as a nation? Have our successes and the bounty that accompanies them caused us to lose the good sense of fire danger that our founders had? The answer is clear—our nation's lack of concern about fire traces back to its inception.

The first permanent English colony in what was to become the United States was established at Jamestown, Virginia, in 1607. The Native Americans who inhabited the area were none too pleased by the arrival of the Englishmen, and the colonists consequently keep constant vigilance with loaded muskets and water buckets to defend against attacks and fires. In 1608, fire destroyed most of Jamestown's buildings and provisions. Captain John Smith later wrote of the fire's impact on the colony: "Many of our old men diseased, and of our new want for lodging, perished."[12] The city of Boston, Massachusetts, was ravaged by nine serious fires before the American Revolution. In response, the Boston general court ordered all buildings to be constructed of brick or stone with slate or tile roofs. The law was never enforced.

Perhaps the most famous conflagration occurred in Chicago in October 1871, when 17,500 buildings were destroyed, more than 300 people were killed, and more than 100,000 were left homeless.[13] Within 1 month of the fire, Joseph Medill, publisher of the *Chicago Tribune*, was elected Chicago's 23rd mayor. Medill ran as the "Fireproof Party" candidate, promising to keep Chicago from ever again suffering the scourge of another conflagration. A powerful Republican journalist, Medill had been an early Free-soiler and a supporter of Abraham Lincoln. His "Fireproof Party" label was proof that even a catastrophe like the great Chicago Fire can be leveraged politically.

Within 3 years of the fire, however, reports had reached the National Board of Fire Underwriters (an arm of the insurance industry) that fire safety conditions in Chicago were deplorable.

The board's investigating committee's report on conditions in Chicago revealed that conditions were actually worse than before the fire in 1871. The fire department was neglected by the city commissioners and was ill trained and poorly equipped. Fire wardens, who were entrusted with construction inspections, made no effort to enforce the city's building regulations.[14] The insurance industry strong-armed Chicago's elected officials into improving the fire department and fire safety conditions by threatening to cancel every insurance policy within the city. The city was given 3 months to comply. At the insistence of the business community, which clearly understood the potential impact of losing insurance coverage, the city conceded 1 week before the deadline.

In *Safeguarding the Home Against Fire*, a 91-page booklet prepared by the National Board of Fire Underwriters and provided free of charge to more than 2 million schoolchildren in 1918[15] Figure 1-1, American "fire waste" was compared with that of European countries[16] Table 1-3. At more than four times that of its European counterparts, the United States' fire loss rate underscored a need for effective fire prevention efforts.

Figure 1-1 *Safeguarding the Home Against Fire* was an early example of public education programs by the business community.

Courtesy of National Board of Fire Underwriters, *Safeguarding the Home Against Fire,* 1918.

Tip

Early 20th-century fire loss figures highlighted our nation's need for effective fire prevention efforts.

Early Fire Prevention Efforts in the United States

Early fire prevention efforts undertaken by state and local governments, usually in the aftermath of a devastating fire, were in the form of laws or ordinances that prohibited the storage or use of flammable materials, limited hazardous occupations in certain districts, and regulated combustible construction. Peter Stuyvesant, governor of the Dutch colony of Nieuw Amsterdam (later called New York), purchased 250 leather buckets, ladders, and hooks and established a tax on every chimney in the colony in order to maintain the equipment. Stuyvesant also established a roving band of fire wardens armed with wooden rattles to be sounded in the event of fire. The Rattle Watch later became unpopular with the public, who considered them "prowlers more than protectors"[17] Figure 1-2.

Table 1-3 A Comparison of "Fire Waste" for the Year 1913

Nation	Fire Loss in 1913
Holland	$0.11
Switzerland	$0.15
Italy and Austria	$0.25
Germany	$0.28
England	$0.33
France	$0.49
United States	$2.10

Data from: National Board of Fire Underwriters, *Safeguarding the Nation Against Fire*, 1918.

The Massachusetts colony passed a law prohibiting smoking outdoors in 1638, making it the first no-smoking law in American history. Similar laws were passed in other colonies.[18] The Pennsylvania legislature passed a no-smoking law that applied to the city of Philadelphia. There is no record that shows that the law was ever repealed.[19]

Fire prevention efforts by nongovernmental organizations also occurred in the American colonies, in many cases with greater success. The first fire insurance company in the American colonies, Charleston's Friendly Society for the Mutual Insuring of Houses Against Fire, was founded in 1735 (though it failed 5 years later after a disastrous fire).[20] In 1752, Benjamin Franklin Figure 1-3 formed the second mutual fire insurance company in America, The Philadelphia Contributionship for the Insurance of Houses from Loss by Fire, known as the Hand-in-Hand because of its firemark Figure 1-4, which was attached to the exterior wall of a building to indicate it was insured. The company is still operating in Philadelphia today. Insurance company practices of reducing risk by insuring only well-built and well-maintained properties and periodically inspecting properties in order to upgrade or maintain the level of risk had the effect of improving fire-safe construction and promoting general fire prevention practices.[21] High-risk combustible construction or unsafe practices resulted in prohibitively high premiums or denial of insurance coverage for the property.

As the Industrial Revolution reached American shores and cities began to grow and become

Figure 1-2 Governor Peter Stuyvesant instituted the "Rattle Watch," fire wardens who carried wooden rattles to sound an alarm of fire.

Figure 1-3 Benjamin Franklin promoted fire prevention and public fire protection.

Courtesy of: National Museum of American History, Kenneth E. Behring Center, Smithsonian Institution

Figure 1-4 The Hand-in-Hand firemark of the Philadelphia Contributionship.

Courtesy of the Smithsonian Institution.

more congested, the threat of **conflagration** became increasingly greater. Investment in industrial buildings and machinery had to be protected by fire insurance. This industry was perhaps the most persistent and energetic in the development of means and methods of preventing fires because its very existence depended on somehow curbing the nation's fire loss. Joseph Freitag, an engineer who specialized in fire protection, detailed American conflagrations in his 1912 treatise *Fire Prevention and Protection as Applied to Building Construction* Table 1-4. He commented:

> All large cities contain localities which are pregnant with conflagration possibilities, principally due to the rapid, haphazard growth and construction of such cities. Large areas of wooden buildings may exist, as in San Francisco; or a large store or warehouse, stocked with inflammable goods; inadequately safeguarded, as at Baltimore may provide the cause. The absence of fire walls, shutters or window protection may turn an ordinary fire into one of great magnitude; while such circumstances as low-water pressure, delay in transmitting alarms, bad judgment or disorganization of the fire department, have all been responsible for wide-spread fires.

Reproduced from: Joseph K. Freitag, *Fire Prevention and Protection as Applied to Building Construction* (Wiley: New York, 1912), page 7.

Early Efforts of the Stock Insurance Industry

Early efforts by the fire insurance industry to protect its financial interests involved working toward uniformity in commissions and rates and attempting to

Table 1-4 American Conflagrations in the 1800s and Early 1900s

Date	City	Fire Loss (USD)
June 1820	Savannah, Georgia	3,000,000
December 1835	New York City	17,000,000
December 1835	Charleston, South Carolina	6,000,000
September 1839	New York City	4,000,000
May 1851	San Francisco	3,500,000
March 1852	New Orleans	5,000,000
July 1866	Portland, Maine	10,000,000
October 1871	Chicago (56 insurance companies bankrupted)	168,000,000
November 1872	Boston (65 acres of the city)	70,000,000
June 1889	Seattle	5,000,000
November 1889	Lynn, Massachusetts	5,000,000
October 1892	Milwaukee	5,000,000
July 1900	Hoboken, New Jersey	5,500,000
May 1901	Jacksonville, Florida	11,000,000
February 1904	Baltimore (140 acres, 1,343 buildings)	40,000,000
April 1906	San Francisco (earthquake & fire)	350,000,000
April 1908	Chelsea, Massachusetts (3,500 buildings)	12,000,000

Reproduced from: Joseph K. Freitag, *Fire Prevention and Protection as Applied to Building Construction*, (New York: Wiley 1912), page 7.

standardize regulations within the United States. The industry first attempted to force Congress to develop federal regulations for the industry by reasoning that the sale of fire insurance in the United States was in fact "interstate commerce." In 1866, *Paul v. Virginia* tested the Commonwealth of Virginia's right to impose restrictions on the issuance of a fire insurance policy to a Virginia business from a New York insurance company. The U.S. Supreme Court ruled that insurance was not interstate commerce; rather, it was the business of the individual states and could be regulated only by the states. This forced the insurance industry to work with each individual state legislature through regional organizations.

The insurance industry financed the test case of Samuel Paul in Petersburg, Virginia through a new organization that had been chartered as the industry and the nation were reeling from a $10 million fire loss in Portland, Maine. It was the first July 4th holiday since hostilities between the states had ended. The fire was caused by a young boy playing with firecrackers in a boat shop, surrounded by flammable materials. Of the $10 million loss, about 50 percent was insured.

Rumors circulated that claims would not be paid because the insurance companies had been bankrupted by the large loss. In the wake of the fire, the National Board of Fire Underwriters was formed by resolution of the major **stock fire insurance** companies. The board's mission was to maintain uniform rates and commissions, repress incendiarism and arson, and devise and give effect to measures to provide for the common interests of the group. The board's attempts to maintain uniform rates and commissions proved to be futile and were abandoned over the years; however, the board's accomplishments in other areas were perhaps the greatest of any other group.

(It is interesting to note that 75 years later, in 1944, the U.S. Supreme Court threw the insurance industry into chaos by reversing *Paul v. Virginia* and overturning state insurance regulations that affected interstate insurance sales. In writing his dissent from the majority, Supreme Court Justice Robert H. Jackson wrote of the decision: "The recklessness of such a course is emphasized when we consider that Congress has not one line of legislation deliberately designed to take over federal responsibility for this important and complicated enterprise.")[22]

The National Board of Fire Underwriters' Accomplishments

Books are written about men and women whose actions affect the course of our world. Sometimes, however, events that have had significant impact on our world go unrecorded and become long forgotten. Such tends to be the case with the insurance executives who founded the National Board of Fire Underwriters, who are in large part responsible for the system of fire prevention and protection that affects every one of us today Figure 1-5. Their mark is on the underpinnings of our modern system of construction and fire safety codes, municipal water supply, fire apparatus, municipal fire alarm systems, fire departments, and the fire insurance rating system. The activities of the board are frequently overlooked during discussions of the evolution of the fire service.

Although the board failed at its original mission of maintaining rates and commissions, its other activities were substantial. It began funding rewards for the conviction of arsonists and developed guidelines for municipal water supplies and firefighting apparatus that evolved into today's standards. In 1896, the National Fire Protection Association was formed under the auspices of the board to promote uniformity in fire protection standards. The mission and accomplishments of NFPA are discussed at length in Chapter 4. Underwriters Laboratories (UL) began as the Underwriters' Electrical Bureau, inspecting and testing electrical displays for the 1893 World's Fair in Chicago on behalf of the National Board of Fire Underwriters.[23]

Tip

The National Board of Fire Underwriters made large contributions our present-day system of fire prevention and protection, and can be tied to the NFPA, UL, and ISO.

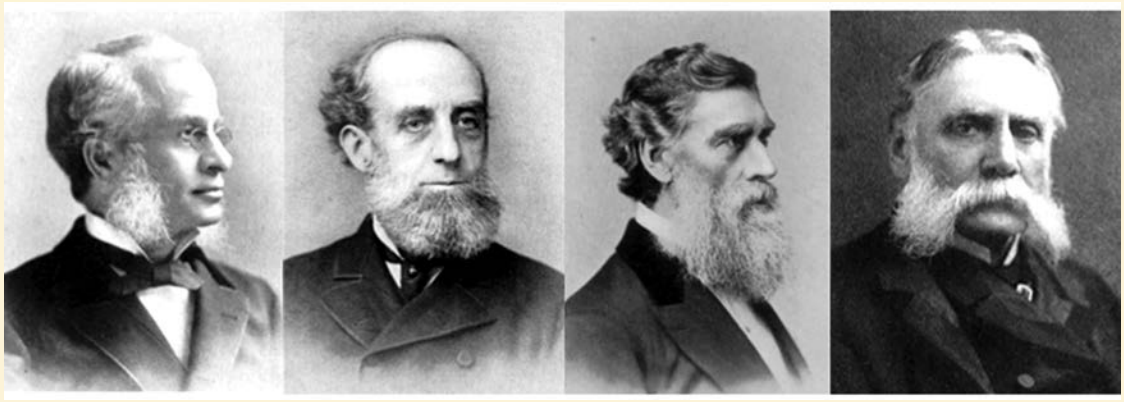

Figure 1-5 The founding fathers of the National Board of Fire Underwriters: Mark Howard, E.W. Crowell, George Hope, and James McLean.

Reproduced from: Harry Chase Brearley, *50 Years of Civilizing Force* (New York: Frederick A. Stokes, 1918), page 22.

The board first published the *National Electrical Code* in 1896, began formal surveys of municipal fire departments in the wake of the 1904 Baltimore conflagration, and published the first *National Building Code* in 1905. The board went on to publish building and fire codes as the American Insurance Association, which then was absorbed by another reorganization and became a part of Insurance Services Office, Incorporated (ISO). We will continue to discuss the legacy of the organization formed in the ashes of the Portland conflagration throughout this text because our system of fire prevention and protection has the fingerprints of the board's engineers on every page and on every part.

Efforts of the Factory Mutuals

While the stock or "for-profit" insurance companies were finding that the most successful method of protecting their financial interests was through the prevention of fire, another group was pursuing a similar path. A system of "factory mutuals" had evolved from small groups of New England cotton mill owners that had banded together in the early 1800s.

In 1835, Zachariah Allen, a mill owner in Allendale, Rhode Island, approached stock insurance companies and requested a discount. He had installed every fire protection feature and appliance available at the time and reasoned that a reduced risk should be awarded. He was informed, however, that "a cotton mill is a cotton mill" and that rates were determined by an average that represented the class of hazard.[24]

Allen organized other mill owners into forming a **mutual fire insurance** company, limited to textile manufacturing. By limiting membership to the best-run mills and requiring each mill to be inspected by an officer of the company each year, risks were reduced. Members of the manufacturer's mutuals were reporting savings of more than 50 percent of the premiums charged by the stock companies.[25]

Allen's protégé, Edward Atkinson, became the president of Factory Mutual in 1877. Atkinson is credited with being the first to apply scientific methods to the study of fire causes. When fires were found to have originated within hollow wall cavities where rats nested and lined their nests with discarded matches, Atkinson issued a rule that

combustible void spaces would be prohibited within heavy timber "mill" construction buildings.[26] To this day, combustible voids are prohibited in Type IV Heavy Timber construction. Atkinson is also credited with having developed the tin-clad fire door, which is basically unchanged today. In addition, Atkinson was a staunch abolitionist and is said to have helped finance John Brown's raid on the federal arsenal at Harper's Ferry, Virginia, with considerably less success.

By the end of the century, the Associated Factory Mutual Companies hired an engineer and inspector to relieve the company officers of inspection duties, and the Factory Mutual System we know today as FM Global was born. Factory Mutual engineers continue to perform fire risk reduction and prevention inspections for their clients, the Allendale Insurance and the Arkwright and Protection Mutual Insurance companies. They work on behalf of the companies that insure the properties, not the companies that own the properties.

Fire Prevention Today

The prevention of hostile fires, the reduction of deaths and fire-related injuries, and the elimination of property losses to fire are of interest to all of us. We all want the same thing, but why we want it depends on our individual interests. How we approach the issue and what methods we are willing to use to reach the goal vary greatly. The methods enlisted by governments, the business community, and other organizations with an interest in fire prevention vary, depending on the political and economic climate.

During World War II, insurance company inspectors detailed to the National Bureau of Industrial Protection submitted more than 63,000 inspection reports to government war agencies and departments, noting safety and security deficiencies in private industrial facilities involved in war production.[27] The fear of sabotage and its impact on war production created an environment in which the American people and U.S. industry were willing to submit to intense government scrutiny. With the dawn of the 21st century came renewed concern and vigilance that our national infrastructure was susceptible to sabotage through arson or bombing. The same axioms that were used to guide the inspectors of the National Bureau of Industrial Protection are valid today.

Governments generally want to promote public welfare; however, government efforts are limited by public sentiment because government officials are ultimately accountable to the voters. Government intrusion, then, is limited to what the public is willing to bear, and Americans in the past have had little tolerance for intrusive government.[28] In the aftermath of a significant fire loss, the public may be willing—in fact, may be eager—to allow increased government intrusion into their activities. This willingness, however, tends to fade over time.

The interests of the business community in fire prevention go directly to the bottom line. Many people have looked down on this motive as coarse and perhaps even inhuman. This shortsighted view overlooks the fact that some of the greatest successes in protecting property and saving lives have evolved from the efforts of businesses to protect their financial interests. *Protecting property saves lives.* Every American's well-being is dependent on a robust economy, and hostile fire is the enemy of a robust economy.

Tip

Some of the greatest successes in protecting property and saving lives have evolved from the efforts of businesses to protect their financial interests.

WRAP-UP

Chapter Summary

- A look at fire prevention efforts reveals patterns of reaction followed by inaction.
- The insurance industry is the most prominent example of a nongovernmental entity that has had a significant impact on fire prevention through the development of regulations.
- The United States' fire record has historically been one of the worst in the Western world.
- The National Commission on Fire Prevention and Control's 1973 report, *America Burning,* was a significant milestone for fire prevention and protection in the second half of the 20th century.
- Since the 1970s, the United States has been successful in reducing the number of fatalities and injuries caused by fired. However, its fire death rate is still significantly higher than that of its European counterparts.
- The impact of hostile fire changed with the formation of civilization. A rampant fire had the potential to destroy an entire city or town.
- The first recorded attempts at fire prevention and protection date back to ancient Rome.
- Early attempts at preventing fire by regulating public behavior can be traced to England.
- The English colonies suffered the effects of hostile fire.
- The Great Chicago Fire occurred in October 1871. It destroyed 17,500 buildings, killed more than 300 people, and left more than 100,000 people homeless. It is one of the most famous conflagrations in American history.
- Early fire prevention efforts undertaken by state and local governments, usually in the aftermath of a devastating fire, were in the form of laws or ordinances that prohibited the storage or use of flammable materials, limited hazardous occupations in certain districts, and regulated combustible construction.
- Fire prevention efforts by nongovernmental organizations, most notably fire insurance companies, also occurred. Insuring only well-built and well-maintained properties and performing periodic inspections had the effect of improving fire-safe construction and promoting general fire prevention practices.
- Stock fire insurance refers to insurance provided by commercial, for-profit companies, such as the insurance companies whose executives founded the National Board of Fire Underwriters.
- The National Board of Fire Underwriters made large contributions to our present-day system of fire prevention and protection, including construction and fire safety codes, municipal water supply, fire apparatus, municipal fire alarm systems, fire departments, and the fire insurance rating system.
- Mutual fire insurance refers to a not-for-profit system in which all policyholders are members of the company. When premiums exceed losses, surplus funds are distributed among the members.
- While the stock insurance companies developed, a system of factory mutuals evolved from small groups of New England cotton mill owners. Today, Factory Mutual engineers continue to perform fire risk reduction and prevention inspections for their clients.
- Present-day fire prevention methods used by governments, the business community, and other organizations vary, depending on the political and economic climate.
- Although we have made many improvements, we must strive to implant the concept of fire prevention as an individual's obligation to the community.

WRAP-UP

Key Terms

Conflagration A very large destructive fire that defies control and causes extensive damage over a large area.

Mutual fire insurance Not-for-profit system in which all policyholders are members of the company; when premiums exceed losses, surplus funds are distributed among the members.

Stock fire insurance Fire insurance provided by commercial, for-profit companies.

Case Study

An October 2013 news brief issued by the U.S. Geological Survey (USGS) Western Ecological Research Center reported the wildfires that occurred in San Diego County, California, in 2003 and 2007 were "remarkably similar in their causes, impacts, and the human responses they elicited." The brief noted that the area has a history of these types of large fire events and addressed possible reasons for their occurrence:

> Essentially every year, in all counties in the southern California region, there are fires that range in size from 1,000 to 10,000 hectares. Although these conditions occur periodically under other climatic regimes, the Mediterranean-type climate results in such conditions annually. Massive fires more than 50,000 hectares in size, similar to the 2003 and 2007 fires, have occurred nine times since the earliest date for which there are records, in 1889.
>
> One reason the southern California region was especially vulnerable to massive fire events in 2003 and 2007 is the extraordinarily long antecedent droughts. The droughts' likely effect was to produce significant amounts of vegetation dieback, which greatly increased ignitions from flying embers downwind of the fire front. This contributed to extraordinarily rapid fire spread that in many cases exceeded fire fighters' capacity for defending homes. However, the resilience of urban communities to the 2003 and 2007 wildfires was largely a function of their location and spatial arrangement. At a landscape scale, homes that burned were distributed in areas that have been historically fire prone and in areas that were located farther inland. Homes at low to intermediate densities and in smaller, isolated neighborhoods were also more likely to be burned. Homes on the interior of developments or on the leeward side largely survived untouched.

1. Which of the following causative factors cannot be controlled or altered?

A. Public indifference
B. Construction type and materials
C. Weather
D. Firebreak maintenance

2. What organization maintains the Western Ecological Research Center?

A. U.S. Geological Survey
B. U.S. Fire Administration
C. U.S. Environmental Protection Agency
D. State of California Department of Forestry

3. What is likely the greatest obstacle to correcting this problem?

   A. Greedy developers
   B. Conservative legislators
   C. Indifferent public
   D. Environmentalists

4. What organization or industry has the greatest potential to address this issue?

   A. U.S. Fire Administration
   B. San Diego County government
   C. National Association of Home Builders
   D. Insurance industry

Information for this case study came from: USGS Western Ecological Research Center, *San Diego Wildfires of 2003 and 2007 Offer Lessons*, October 2013. Available at: http://www.cafiresci.org/s/Chapter-5-WERC-PubBrief-201310-Keeley-SD-Fires.pdf

Review Questions

1. Name three national reports on fire protection and prevention in the United States in the latter 20th and early 21st centuries.
2. What is the term used to describe for-profit insurance companies?
3. What is the term used to describe insurance companies that are formed by groups as not-for-profit entities?
4. Which group was responsible for the development of the National Building Code in 1905?
5. When engineers from FM Global (Factory Mutual) conduct inspections at industrial facilities, whose interests are they hired to protect?
6. What group was responsible for forming the National Fire Protection Association?
7. What was the original mission of the National Fire Protection Association?

Discussion Questions

1. *Acceptable risk* is the term used to describe the level of fire risk that the general public is willing to bear at a given time. In the aftermath of a well-publicized fire incident, the level of acceptable risk changes, and the public demands action. List some recent fire events that have sparked a public outcry and discuss what steps were taken in response to public demand.
2. Based on your answer to question 1, which groups (public, business, special interest) were involved in the development of fire prevention strategies, what were their motives, and which were successful?
3. Based on your answer to question 1, were the steps taken to improve public safety meaningful, or were they merely window dressing to mollify the public?

WRAP-UP

Additional Resources

In-depth information on many of the subjects discussed in this chapter can be found in the following texts and publications and at these websites.

The U.S Fire Problem and Fire Loss Statistics

America Burning (1973), *America Burning Revisited* (1987), and *America at Risk* (2000) are available from the U.S. Fire Administration at www.usfa.fema.gov

Fire in the United States, U.S. Fire Administration, National Fire Data Center, published each year and available at www.usfa.fema.gov

Fire Loss in the United States, National Fire Protection Association, available at www.nfpa.org Nonmembers may download various statistical reports in PDF format.

Fires

Harry Chase Brearley, *Fifty Years of Civilizing Force* (Frederick A. Stokes, 1916).

Robert Cromie, *The Great Chicago Fire* (Rutledge Hill Press, 1994).

Michael Dineen, *Great Fires of America* (Country Beautiful, 1973).

James Leasor, *The Plague and the Fire* (McGraw-Hill, 1961).

Paul Lyons, *Fire in America* (National Fire Protection Association, 1976).

The Fire Insurance Industry

National Board of Fire Underwriters, *Pioneers of Progress* (National Board of Fire Underwriters, 1941).

Prevention, a Factual Visual History of Property Loss and Control, Including the Role Played by Factory Mutual (Factory Mutual Engineering Corporation, 1996).

A.L. Todd, *A Spark Ignited in Portland* (McGraw-Hill, 1966).

Dan Yorke, *Able Men of Boston* (Boston Manufacturers Mutual Fire Insurance Company, 1950).

End Notes

1. *America Burning* (Washington, DC: National Commission on Fire Prevention and Control, May 4, 1973), page 1.
2. *Fire in the United States*, 14th ed. (Emmitsburg, MD: United States Fire Administration, National Fire Data Center, August 2007), page 2.
3. Ronny J. Coleman et al., *Managing Fire Services* (Washington, DC: International City/County Management Association, 1988), page 4.
4. John Emsley, *The 13th Element* (New York: Wiley, 2000), page 66.
5. Ibid., page 74
6. Alexander Reid, *Aye Ready!* (Edinburgh, Scotland: George Steward & Company, 1974), page 5.
7. Coleman et al., page 7.
8. James Leasor, *The Plague and the Fire* (London: McGraw-Hill, 1961), page 35.
9. Ibid., page 195.
10. Coleman et al., page 10.
11. Arthur Cote, P.E. and Percy Bugbee, *Principles of Fire Protection* (Quincy, MA: National Fire Protection Association, 1988), page 3.
12. Michael P. Dineen et al., *Great Fires of America* (Waukesha, WI: Country Beautiful Corporation, 1973), page 28.
13. Ibid., page 12.
14. Harry Chase Brearley, *Fifty Years of Civilizing Force* (New York: Frederick A. Stokes, 1916), page 42.
15. *1930 Fire Prevention Yearbook* (Baltimore: Hough and Lawson), page 4.
16. National Board of Fire Underwriters, *Safeguarding the Home Against Fire* (New York: National Board of Fire Underwriters, 1918), page 9.

17. Coleman et al., page 10.

18. Ibid.

19. Ibid., page 8.

20. Nicholas B. Wainwright, *A Philadelphia Story* (Philadelphia: William F. Fell, 1952), page 21.

21. *Prevention, a Factual Visual History of Property Loss and Control, including the Role Played by Factory Mutual* (Norwood, MA: Factory Mutual Engineering Corporation, 1996), page 4.

22. A.L. Todd, *A Spark Lighted in Portland* (New York: McGraw-Hill, 1966), page 219.

23. Brearley, page 195.

24. Peter J. McKeon, *Fire Prevention* (New York: The Chief Publishing, 1912), page 1.

25. Dan Yorke, *Able Men of Boston* (Boston: Boston Manufacturers Mutual Fire Insurance Company, 1950), page 30.

26. McKeon, page 3.

27. *On Guard, the Story of an Industry in War* (Washington DC: National Bureau for Industrial Protection, 1946), page 9.

28. *Fire Death Rates, an International Perspective* (Washington, DC: United States Fire Administration, 1997), page 12.

CHAPTER 2

Public Fire Prevention Organizations and Functions

LEARNING OBJECTIVES

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

- Discuss the role of federal, state, and local governments in the prevention of fires and the reduction in fire deaths and injuries.
- Contrast the roles among the three levels of government in the prevention of fires.
- Name the watershed federal fire programs and describe the events or national conditions that led to their creation.
- List the fire prevention functions performed by traditional fire prevention bureaus and describe nontraditional systems for delivery of those services.
- List federal agencies involved in fire prevention and describe their missions and programs.

Case Study

The following was taken verbatim from the Minnesota State Fire Marshal's *2012 Fire in Minnesota Annual Report*. Pay particular attention to the final section, *Closing Thoughts*.

The Verso Paper Mill was an economic mainstay in Sartell, Minnesota, a community of just over 16,000 located a few miles north of St. Cloud. The paper mill dated back to the early 1900s, and in modern times provided stable, good-paying jobs to about 260 workers, most of who resided in the greater Sartell–St. Cloud area.

On Memorial Day, May 28, 2012 at 11:21 a.m. an explosion and subsequent fire severely damaged part of the paper mill complex. Several employees were injured in the explosion—one, fatally. The mill sustained an estimated $60 million in structural damage and $18 million in lost contents. It took eight days to extinguish the fire, fought by the Sartell Fire Department with assistance from several other fire departments and specialized rescue teams. Firefighting efforts were hampered by the size of the building, its eventual collapse, and the fact that a major railroad line intersected the property.

In recent years the paper milling industry had experienced a nationwide decline. Verso was not spared the effects of the paper industry downturn, but the Verso Plant was working on a large production order for a major customer at the time of the catastrophe.

Following the explosion and fire, Verso Paper shuttered the Sartell plant; it was sold to a developer for demolition in March, 2013.

The Cause:

The explosion occurred in a tank for one of the large air compressors that powered equipment in the plant. While responding to an alarm from one of the compressors, employees from the plant's inside fire brigade encountered flames; seconds later a large explosion rocked that area of the plant.

In that explosion, Verso plant employee Jon Maus was killed while attempting to contain the flames from the tank of the compressor, and five other employees were injured. The cause was determined to be an overheated compressor. For reasons unknown, the compressor, which was designed to shut down automatically, did not shut down from the high temperatures. It is possible that the oil used to lubricate the compressor ignited in the high temperatures, setting off the explosion and subsequent fire.

The Impacts:

The effects of this incident were felt by many and continue to be felt a year later. Most tragically, Verso employee Jon Maus lost his life responding to the alarm from the compressor. Mr. Maus is survived by his wife, four children, and numerous friends and relatives.

For residents of Sartell and surrounding areas, the loss of 175–250 jobs has been felt by workers, their families, and local merchants as the lay-offs resulted in the loss of income and purchasing power. The adverse economic impact may have a "trickle-down" effect on the community, home values, and the tax base for years.

For Verso Paper there was a major business interruption and concerns about the ability to fulfill on the large production order in progress. The company had to pay for moving Sartell production operations to other plants and sustained a significant loss of product. According to information filed with the Securities and Exchange Commission, Verso reported that the "…closure reduces annual coated groundwood

capacity by 180,000 tons, or 20 percent." Verso also lost about 35,000 tons of paper processing capacity.

Closing Thoughts:

Along with saving lives and minimizing property damage, one objective of fire prevention activity is to maintain business continuity. Virtually all fires are preventable. With this in mind, it can be argued that communities and fire departments have an obligation to go above and beyond to protect large employers and manufacturers against the disruptive threat of fire. Large companies and employers also have an obligation to the communities they occupy to prevent the personal disruptions and economic distress that result from these types of tragedies.

1. Name the three largest employers in your jurisdiction.
2. Describe the potential impact a major fire could have on employment and tax revenue.
3. Develop talking points based on the Sartell fire to justify a special inspection program, if authorized by the state or local fire code.

Information for this case study came from: *2012 Fire in Minnesota Annual Report*. https://dps.mn.gov/divisions/sfm/mfirs/Documents/Fire%20in%20Minnesota/Fire%20in%20MN%202012.pdf

Introduction

The mantle of fire prevention has been carried by a variety of organizations throughout our nation's history. Some were nobly interested in the public welfare; others were profit driven, looking to reduce insurance payouts. Regardless of the motivation, we all benefit when the incidence of hostile fire is reduced. Jobs; the economy; and public spending for education, health care, and public infrastructure are all threatened by hostile fires. Those left suddenly unemployed in the wake of a fire lose purchasing power. That loss is felt by the local economy in reduced sales, which eventually leads to further unemployment. Sales tax collection decreases, and the unemployed find themselves unable to meet their financial obligations. Mortgages and consumer loans default, property values drop, and real estate tax collection declines. The reduction in tax collection inevitably leads to reduced public spending for schools and public services.

There are both public and private organizations involved in the prevention of fires in the United States. Each category plays an important role. This chapter describes government (public) organizations. We'll discuss private fire prevention and protection organizations, as well as private not-for-profits, in Chapter 3. The role of private, not-for-profit organizations that develop and maintain codes and standards will be described in Chapter 4.

World War II saw a massive fire prevention effort, both to safeguard precious materials needed for the war effort and to protect against sabotage by arson. With access to the natural resources needed to manufacture military vehicles, parachutes, and even life jackets blocked by Germany and Japan, the United States embarked on a massive conservation and recycling effort to marshal the production materials to rearm the military and prepare for war. "Get in the Scrap" campaigns were aimed at enlisting the public's help in procuring materials such as rubber, silk, cork, and kapok needed for the manufacture of military equipment. Stocks of these precious materials had to be protected from fire. About 18,000 tons of crude rubber, enough for 4 million tires, was lost in

a single fire in Fall River, Massachusetts, in 1941.[1] Direct losses from wartime fires in the United States were estimated by the National Fire Protection Association (NFPA) in 1943 at $2 million a day, with indirect losses caused by interruption of production being far more serious for the war effort.[2] The fear underlying daily life in the United States in the 1940s, as the nation fought a massive war in Europe and Asia at the same time, must have been strong inducement for every American to do his or her part in preventing fires.

Organizations with the Mission of Fire Prevention

Traditional Fire Prevention Bureaus

The bulk of fire prevention activities in the United States are performed by local fire departments and local fire prevention bureaus. The U.S. Fire Administration's National Fire Census reported that 59.9 percent of the 26,482 departments that participated in the census, as of January 2012, provided fire/injury prevention and public education. Fire inspections and code enforcement were conducted by 34.2 percent of departments.[3]

Fire departments in the United States became involved in the prevention of fires in the early 20th century, although Columbus, Ohio, had inspections by fire companies as early as 1897. The first American National Fire Prevention Convention was held in Philadelphia in 1913. The official record includes the text of every presentation given during the 6-day meeting. A paper entitled *Public Fire Protection*, containing information regarding inspections by municipal fire departments, was presented on October 14, 1913, the second day of the convention Table 2-1. Its presenters were Powell Evans, chairman of the Philadelphia Fire Commission and the U.S. Chamber of Commerce's Fire Waste Committee, and J.S. Mallory, acting fire marshal for the City of Philadelphia.[4]

The Fire Department City of New York (FDNY) Bureau of Fire Prevention was established in 1912 as a result of the Sullivan–Hooey Act. The law amended the city's charter and gave control over all the fire department bureaus, including the new Bureau of Fire Prevention, to the commissioner.[5] The Sullivan–Hooey law was passed in the aftermath of the Triangle Shirtwaist fire, in which 146 persons, mostly young women, were killed in a garment factory fire. By 1925, fire prevention bureaus were also operating within the fire departments in the cities of Chicago, Philadelphia, Cincinnati, Detroit, Providence, and Memphis.[6]

Early fire prevention bureaus enforced locally developed fire prevention regulations by performing

Table 2-1 Fire Department Inspection Programs in 1913

City	Inspectors	Details
New York City	65 inspectors	Tenements were inspected by housing inspectors
Chicago	150 company officers	Held fire drills in 150 large factories and schools
Kansas City	4 fire wardens	
Rochester, NY	4 battalion chiefs	
Cincinnati, OH	Company inspections	Began in 1912; half of the commercial buildings were inspected first year
Jersey City, NJ	Captains	Authority to issue orders
Columbus, OH	Company inspections	Since 1897
Lansing, MI	Captains	Since 1903
Superior, WI	Company inspections	Since 1911
Youngstown, OH	Company inspections	Per capita fire loss reduced from $4 to 40 cents
Philadelphia	One man from each of the 80 companies	Each inspector performed five to eight inspections per day

Data from: Powell Evans and J.C. Mallory, "Public Fire Protection Management," Report of the First American National Fire Prevention Convention, 1913, page 151.

inspections Figure 2-1. The fire prevention sections of the Greater New York Charter, as amended by the Sullivan–Hooey Act, contained a fairly extensive set of regulations that covered hazards from gaslights and open burning to storage of explosives. The regulations required fire alarms; watchmen in hotels, hospitals, and lodging houses; fire fighters in theaters during performances; fire extinguishing equipment; and exit signs. The regulations even made building owners who failed to cover hoistways, trapdoors, or fire shutters liable for injuries to fire fighters.[7]

Fire departments and fire prevention bureaus became involved in fire prevention education early in the 20th century. Fire Prevention Week was inaugurated in 1911 at the suggestion of the Fire Marshals Association of North America. The campaign was led by the National Board of Fire Underwriters and was supported by the U.S. Chamber of Commerce, the NFPA, and others.[8]

The first model fire prevention code was developed by the National Board of Fire Underwriters in 1930. It was similar to current fire codes, regulating hazardous conditions ranging from dry-cleaning operations to vehicle repair garages. The board's *Suggested Fire Prevention Ordinance* was renamed the *National Fire Prevention Code* in 1953.

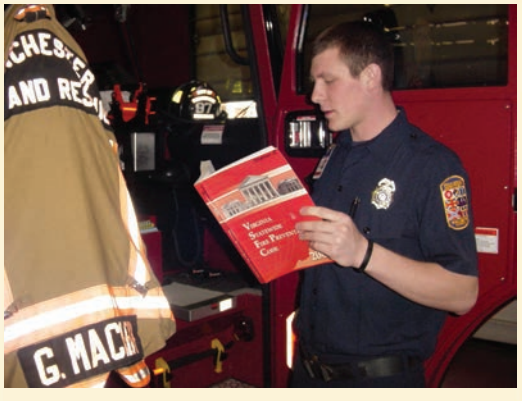

Figure 2-1 Inspection by in-service fire companies has its roots in the late 1800s and early 1900s.

Courtesy of Jeremy Luttrell.

Tip

Fire codes are designed to prevent fires by regulating open flames, heat-producing processes, materials storage, and other hazardous processes. Building codes are designed to minimize the impact of fire by limiting combustible construction, providing fire-resistance ratings, protecting openings, and mandating fixed fire suppression systems.

Texture: Eky Studio/ShutterStock, Inc.; Steel: © Sharpshot/Dreamstime.com

Fire codes require that acceptance tests of mandated **fire protection systems** be performed in the presence of the fire official. Permits required to install the systems are contingent on submission of plans before installation. Review of fire protection system plans naturally fell to fire prevention bureaus, even though the systems were often required by building codes. With plan review systems already in place, the review of fire access roads and other fire protection features required by model building codes also became the purview of fire prevention bureaus.

The earliest fire prevention **ordinances** authorized fire prevention bureaus to investigate the causes and origins of hostile fires. Over time, the role and power of many bureaus expanded from cause and origin to follow-up investigation and associated investigative functions, including arrest and referral for prosecution. Many modern fire prevention bureaus have fire department employees assigned to fire investigation duties full-time. Many local ordinances charge the fire prevention bureau with the investigation of fires and explosions and crimes related thereto.

Nontraditional Fire Prevention Bureaus

Not all fire departments have fire prevention bureaus. In some jurisdictions, traditional fire prevention

bureau functions simply are not performed or are performed by another agency or agencies. In the aftermath of a fire that killed 25 employees of the Imperial Foods chicken processing plant in Hamlet, North Carolina, the fire chief stated that the entire incident centered around the lack of enforcement of existing codes.[9] The fire department was not adequately staffed to perform inspections.

In some areas, certain traditional fire prevention functions have been shifted to other agencies, usually in the name of streamlining government. Some jurisdictions have located all inspection functions within one agency. In these instances, adequate training and supervision are essential for ensuring that all types of inspections can be performed effectively by the designated inspector.

Tip

Training and supervision are especially crucial in jurisdictions where all inspection functions are assigned to a single agency.

State Fire Prevention and Protection Programs

The Commonwealth of Massachusetts empowered a state official to investigate fires and regulate fire waste in 1902. Five other states had followed suit by 1906, and by 1913, 40 states had established the position of fire marshal or other officer with similar powers.[10]

The 50 state governments and territorial governments have fire prevention programs that provide code development, inspection, engineering services, and fire investigation services to the jurisdictions within the state. In many cases, the agency, under the direction of the state fire marshal, provides basic services to rural areas without municipal services. State fire prevention offices are sometimes located within state insurance bureaus, state fire service training agencies, state forestry departments, or state law enforcement agencies Figure 2-2. In some states, local fire marshals derive their powers as deputy state fire marshals.

The largest such agency is the California Department of Forestry and Fire Protection (CAL FIRE), which provides fire protection for the state's privately owned wildlands. CAL FIRE also provides fire suppression service under contract for 35 of the state's counties. The California State Fire Marshal's Office is within CAL FIRE; it provides engineering, fire safety education, code enforcement, and investigation services. The fire marshal's office is also responsible for state fire training.

State Fire Training Programs

State fire training organizations are often not associated with the state fire marshal's office, although they sometimes provide training for the fire marshal's staff as well as for local fire prevention personnel. Some are located within state universities; others are independent agencies. Training is a fundamental element in any fire prevention program. Without effective training and competent personnel,

State Police or Public Safety
Department of Insurance
Department of Labor
Department of Housing
Department of Justice
Department of Community Affairs
Department of State
Department of Commerce
State Fire Commission

Figure 2-2 The location of the state fire marshal office within state government will affect the duties and responsibilities of the office.

fire prevention programs cannot successfully carry out their code-required mandate.

Tip

In order to reach their full potential, fire prevention programs require effective training and competent personnel.

Fire Prevention Efforts of the Federal Government

The federal government has always had an interest in the prevention of fires. For most of our history, federal fire prevention efforts were geared toward the protection of government property and ensuring the continuity of government functions. Protection of the public from fire was, for the most part, an issue for the states and their political subdivisions.

Tip

Protection of the public from fire was, for the most part, an issue for the states and their political subdivisions. The federal government's fire prevention programs were focused on the protection of federal government properties and assets.

Research and fire tests conducted by the federal government, however, had a twofold purpose early in the 20th century. Reducing the fire threat to government institutions was a primary consideration in Congress's appropriations for federal agencies that conducted fire research. Obtaining "fundamental engineering data to serve as a basis for the revision and reconstruction of state and municipal building codes" was a stated goal in the establishment of the Bureau of Standards fire research lab in 1914.[11]

In 1906, the total value of buildings under the supervision of the supervising architect of the United States Treasury was $200,000,000. Because the structures were not insured, Congress appropriated funds to establish a materials testing laboratory, aimed at reducing construction costs while providing the utmost protection against fires and earthquakes. By the end of 1907, the U.S. Geological Survey Structural Materials Testing Laboratory in Saint Louis had conducted 35,000 fire tests on beams, columns, and other structural components.[12] Other government agencies became involved in fire research over time, notably the Commerce Department's Bureau of Standards.

Catalysts for Federal Fire Prevention Programs

In addition to the protection of the government's infrastructure, other events led the federal government to allocate resources to fire prevention activities. The main event that led to the establishment of a fire research facility at the National Institute for Standards and Technology was a fire in a pile of leaves on the grounds of the then-Bureau of Standards in 1904. In fighting the fire, the employees discovered that fire hoses from different buildings within the complex could not be coupled together because they had different thread patterns.[13] In the same year, the same problem contributed to the Baltimore conflagration in which 140 acres and 1,343 buildings in the downtown area were destroyed.[14] The following year, NFPA, with the active participation of the Bureau, adopted a national standard for hose coupling threads.

President Woodrow Wilson issued the first National Fire Prevention Day Proclamation in 1920. President Warren Harding officially proclaimed the first Fire Prevention Week in 1922 with the statement: "Fire Prevention Week is to be observed by every man, woman, and child, not only during the week designated in this pronouncement but throughout every hour of every day of every year."[15] The idea was not born in Washington, however. Fire Prevention Day had been around for almost a decade before its first federal recognition, first observed in

1911 at the suggestion of the Fire Marshal's Association of North America. The National Board of Fire Underwriters approached state governors, many of whom issued Fire Prevention Day proclamations.[16]

As previously mentioned, fire prevention was a big part of the nation's civil defense efforts during World War II. In addition to preserving precious materials for the war effort, the prevention of sabotage by arson was high on the list of national defense concerns. In June 1940, 18 months before the attack on Pearl Harbor, executives of the nation's fire insurance companies organized the Insurance Committee for the Protection of American Industrial Plants to develop strategies to protect American manufacturing facilities that were preparing for war. By June 1941, the committee had established the National Bureau for Industrial Protection in Washington.[17]

The National Bureau for Industrial Protection first partnered with the Federal Bureau of Investigation (FBI) to reduce the threat of sabotage. The FBI used the reports of insurance inspectors to assess security weaknesses at industrial plants. Among the issues evaluated were the fitness of plant guards and watchmen based on their ability and loyalty, as well as fencing, lighting, adequacy of alarms, and facility access. Within months, responsibility for plant security was transferred to the War and Navy Departments, who called on the National Bureau for Industrial Protection to develop regulations for materials and equipment storage. The engineering department of the National Board of Fire Underwriters assigned almost 100 percent of its field staff to the National Bureau for Industrial Protection.[18] Bureau inspectors prepared more than 3,000 individual reports on materials storage for the War Department and War Production Board.[19]

In July 1945, Navy Secretary James Forrestal wrote the National Bureau for Industrial Protection after receiving its final reports:

> I cannot let this occasion pass without expressing my appreciation of the magnificent job which has been done by the National Bureau of Industrial Protection. Sixty-five thousand inspections made by experienced engineers constitute a service to the nation which the Army and Navy would have been at a loss to secure without the aid of your Bureau.
>
> Reproduced from: *On Guard, the Unsung Story of an Industry in War* (Washington, DC: National Bureau for Industrial Protection, 1946), page 23.

Five months later, President Truman wrote a similarly glowing letter, conveying the country's "grateful thanks" and praise to Harold V. Smith, chairman of the Insurance Committee for the Protection of American Industrial Plants, the parent organization of the Bureau.[20] Whether insurance executives approached the Truman administration in its moment of gratitude is unknown, but no greater token of thanks could have been offered the insurance industry than the Presidential Conference on Fire Prevention.

President Truman's Fire Prevention Conference

In January 1947, the Truman administration distributed a press release announcing an upcoming national fire prevention conference Figure 2-3. Representatives of the 48 state governors, business and industry, academia, the fire service, and the federal government met in Washington, DC, in May of that year and made remarkable progress. As a result of the conference, 34 governors set up committees on fire prevention. Eighteen states held their own conferences to build on the work begun in Washington. Fire commissions were established in some states. The State of Connecticut adopted its first state fire prevention code, and Georgia adopted a building code.[21]

Among the accomplishments of the conference committees, and perhaps the one with the most significant impact, was the development of a draft model statute permitting the adoption of **model codes**. The National Institute of Municipal Law Officers, Council of State Governments, National Association of Attorneys General, and American Standards Association undertook the presentation of the statute to the state legislatures in 1949. Before development of the model statute and summary adoption by many states, fire and building codes were typically locally developed and sometimes crudely crafted regulations.

NATIONAL CONFERENCE ON FIRE PREVENTION

For more than a decade the loss of property in the United States due to fires has been steadily mounting year by year. During this period an average of 10,000 persons have been burned to death or have died of burns annually. In the first nine months of this year fire losses reached the total of nearly half a billion dollars, with the prospect that final reports for 1946 will show this year to have been the most disastrous in our history with respect to fire losses.

Additional millions must be added to the nation's bill because of forest fires which, in 1945, accounted for the destruction of more than 26 million dollars worth of timber, a precious national resource. Also must be added the enormous sums spent in fighting and controlling fires.

This terrible destruction of lives and property could have been almost entirely averted if proper precautions had been taken in time. Destructive fires are due to carelessness or to ignorance of the proper methods of prevention. These techniques have been tested, but they must be much more intensively applied in every State and local community in the country.

The President has, therefore, decide to call a National Conference on Fire Prevention, to be held in Washington within the next few months, to bring the ever-present danger from fire home to all our people, and to devise additional methods to intensify the work of fire prevention in every town and city in the Nation.

He has appointed Major General Philip B. Fleming, Administrator of the Federal Works Agency and of the Office of Temporary Controls, to serve as general chairman of the conference. General Fleming, who served in a similar capacity during the President's Conference on Highway Safety last May, already is at work on preliminary arrangements for the meeting, to which will be invited State and local officials who have legal responsibilities in the matter of fire prevention and control, and representatives of non-official organizations working in this field.

The new impetus given to the prevention of traffic fatalities by the Highway Safety Conference already has resulted in saving several thousand lives, and the benefits will continue to be felt as the techniques adopted by the conference are increasingly applied. The President is encouraged to hope, therefore, that a similar attack on fire losses will yield corresponding benefits.

Indeed, that the taking of proper precautions can stem this staggering drain on our resources is well illustrated in our experience with the Nation's forests. Although the acreage of our unprotected forest lands amounts to only 25% of the acreage of our protected forests, the losses of the former in 1945 exceeded those of the protected tracts by more than 20%.

The President said: "I can think of no more fitting memorial to those who died needlessly this year in the LaSalle Hotel fire in Chicago, the appalling disaster at the Winecoff Hotel in Atlanta, and the more recent New York tenement holocaust than that we should dedicate ourselves anew to ceaseless war upon the fire menace."

Figure 2-3 President Truman's 1947 Fire Prevention Conference was attended by 48 state representatives, along with representatives of the business community, academia, and the federal government.

Reproduced from: U.S Fire Administration, Announcement — a News Release of January 3, 1947, http://www.usfa.fema.gov/downloads/pdf/47report/announce.pdf

Federal Agencies Involved in Fire Protection

The first major federal program aimed at specifically reducing the fire threat to the general public was instituted in 1974. Public Law 93-478, the Federal Fire Prevention and Control Act, established a federal fire focus while recognizing that fire prevention and protection are fundamentally the responsibility of state and local governments. The result of more than 8 years of hard work and patience, the act was born in a 1966 report, *Wingspread Conference on Fire Service Administration, Education and Research: Statements of National Significance to the United States*. The report called for the establishment of a national commission on fire prevention and control:

> The traditional concept that fire protection is strictly a responsibility of local government must be re-examined. A principle of fire protection which many fire departments and governmental jurisdictions have had to learn the hard way is stated as follows: It is economically unfeasible for any single governmental jurisdiction to equip and man itself with sufficient forces to cope with the maximum situation with which it may be faced.
>
> Reproduced from: The Johnson Foundation, *Wingspread Conference on Fire Service Administration, Education and Research: Statements of National Significance to the United States* (Racine, WI: Johnson Foundation, 1966), page 3.

Tip

The first major federal program aimed at specifically reducing the fire threat to the general public was instituted in 1974.

National Commission on Fire Prevention and Control

The 1968 Fire Research Safety Act established the National Commission on Fire Prevention and Control, a 24-member panel appointed by President Richard Nixon. Its report, *America Burning*, has proven to be one of the most significant forces for fire prevention and protection in U.S. history. Among the findings of the commission were:

- More emphasis on fire prevention is required. Fire departments need to expend more effort on fire safety education, inspection, and code enforcement.
- Better training and education for the fire service is of utmost importance.
- Improved built-in fire protection features in structures would save many lives and avoid property damage.
- Increased involvement of the U.S. Consumer Product Safety Commission (CPSC) in regulation of materials and products affecting fire safety.
- Firefighting, burn prevention and treatment, and protection of the built environment from combustion hazards are important areas of research that have been neglected. (Appendix B of this text includes all 90 of the commission's recommendations to Congress.)[22]

The commission called for the creation of the U.S. Fire Administration (USFA), which would establish a national fire data system, monitor fire research, and provide block grants to states and local governments for fire protection and prevention, and for the establishment of the National Fire Academy (NFA).[23]

United States Fire Administration

The USFA was created in 1974 as the National Fire Prevention and Control Administration by the Federal Fire Prevention and Control Act of 1974 (15 USC 2202). In 1979, it was renamed the USFA and became part of the Federal Emergency Management Agency (FEMA). As a result of the Department of Homeland Security Act of 2002, FEMA became part of the U.S. Department of Homeland Security, within the Directorate of Emergency Preparedness and Response.

The USFA is headquartered in Emmitsburg, Maryland, and occupies the former campus of Saint Joseph's College Figure 2-4. The USFA's efforts fall into four basic areas: public education; training for fire and emergency response personnel; fire safety

Figure 2-4 The National Emergency Training Center, home of the U.S. Fire Administration and the National Fire Academy.

Curtesy of the National Emergency Training Center.

technology, testing, and research; and the collection, analysis, and dissemination of pertinent data.

USFA Public Education Programs

The USFA develops and delivers educational programs geared toward fire prevention and safety. Public education pamphlets and materials can be obtained through the USFA Publications Center or ordered online. The Fire Safety Directory is a list of materials and resources available from other organizations ranging from burn and scald prevention to electrical hazards. The USFA maintains the list to assist agencies interested in developing public education programs.

Tip

The USFA develops and delivers fire prevention and safety education programs. Public education materials may be ordered by phone or online.

Texture: Eky Studio/ShutterStock, Inc.; Steel: © Sharpshot/Dreamstime.com

USFA Training Programs

USFA training programs operate out of the National Emergency Training Center (NETC) located at the Emmitsburg campus Figure 2-5. The NETC comprises the NFA and the Emergency Management Institute (EMI).

The NFA provides resident training courses at the Emmitsburg campus and courses throughout the country in cooperation with state and regional training organizations. It is estimated that more than 1,400,000 students have received training through a variety of course delivery methods.

Technical and management courses in fire prevention and code enforcement, incident management, hazardous materials, public education, budgeting for fire protection, and emergency planning are among the courses of instruction provided. The number of students who attend courses produced for delivery by other organizations through regional deliveries and NFA-developed handoff courses and through independent self-study is almost five times the number able to attend resident courses.[24]

The EMI focuses on civil defense and natural disaster preparedness. Fires are a natural disaster, and fire service personnel attend the EMI courses in multiagency management of fires, earthquakes, floods, and other natural disasters.

USFA Fire Safety Technology Programs

The USFA works with public groups and agencies, as well as private organizations, in promoting fire safety through research, testing, and evaluation. A key issue identified in *America Burning* was fire fighter safety and the high rate of fire fighter injuries

Figure 2-5 More than 5,000 students attend resident courses at the National Fire Academy each year.

Courtesy of the National Emergency Training Center.

and deaths. The agency develops and distributes research, studies, and other materials to the fire service, design professionals, other fire protection organizations, and the public.

USFA Data Collection, Analysis, and Dissemination

America Burning contained 90 recommendations. The first was for Congress to establish and fund the USFA to provide a national focus for fire protection and prevention issues. The second was that a national fire data system be established to "provide a continuing review and analysis of the entire fire problem."[25]

Lacking valid national statistics, the code development process must rely on anecdotal evidence that may or may not be valid. The National Fire Data Center studies and reports on the nation's fire problem, proposes solutions and priorities, and monitors proposed solutions. *Fire in the United States* is published by the USFA and distributed free of charge.

Tip

Without valid data, the code development process relies on anecdotal evidence.

Texture: Eky Studio/ShutterStock, Inc.; Steel: © Sharpshot/Dreamstime.com

Fire and Emergency Services Higher Education Program

The Fire and Emergency Services Higher Education Program (FESHE) is an NFA program whose mission is to "establish an organization of post-secondary institutions to promote higher education and to enhance the recognition of the fire and emergency services as profession to reduce loss of life and property from fire and other hazards."[26] To accomplish the mission, annual conferences are held at the NFA campus, attended by representatives from fire-related degree programs, state and local fire service training agencies, and national fire service organizations. The conferences focus on higher education, sharing ideas, and addressing new challenges Figure 2-6.

Figure 2-6 The focuses of the FESHE conferences are higher education, sharing ideas, and addressing new challenges.

Courtesy of U.S. Fire Administration.

FESHE committees maintain the National Professional Development Model (NPDM), a spreadsheet matrix designed to list professional competencies, education, and training in one document. Training and certification agencies and academic fire programs can adopt the NPDM and customize it to fit their needs, eliminating the often fragmented and stove-piped system of training, higher education, and certification to one that is competency based and completely integrated. FESHE committees also maintain model course outlines for fire-related and emergency medical services (EMS) management degree programs in partnership with publishers to write textbooks used in fire and EMS degree programs.

Both associate's and bachelor's degree curricula are maintained by the FESHE committees. The National FESHE Associate's Model Curriculum includes core six courses:

- Building Construction for Fire Protection
- Fire Behavior and Combustion
- Fire Prevention
- Fire Protection Systems

- Principles of Emergency Services
- Principles of Fire and Emergency Services Safety and Survival

Related noncore courses include:

- Principles of Fire and Emergency Services Administration
- Fire Investigation I
- Fire Investigation II
- Fire Protection Hydraulics and Water Supply
- Hazardous Materials Chemistry
- Legal Aspects of Emergency Services
- Occupational Safety and Health for Emergency Services
- Strategy and Tactics

The National FESHE Bachelor's Model Curriculum includes 15 junior- and senior-level courses developed by the NFA Table 2-2. The NFA has partnered with seven accredited colleges and universities that offer bachelor's degrees with concentrations in fire administration and fire prevention technology. Online training is particularly attractive to fire service personnel whose work schedules make traditional classroom attendance complicated or impossible. Hand-off classes are developed by USFA and made available to state and local fire training agencies. They enable hundreds of students to attend classes locally, without incurring travel costs and associated loss in productivity.

Table 2-2 National FESHE Bachelor's Model Curriculum

Analytical Approaches to Public Fire Protection
Applications of Fire Research
Community Risk Reduction for the Fire and Emergency Services
Disaster Planning and Control
Fire and Emergency Services Administration
Fire Dynamics
Fire Investigation and Analysis
Fire Prevention, Organization, and Management
Fire Protection Structures and Systems
Fire-Related Human Behavior
Managerial Issues in Hazardous Materials
Personnel Management for the Fire and Emergency Services
Political and Legal Foundations for Fire Protection
Issues in Fire/EMS Management
Advanced Principles in Fire and Emergency Services Safety and Survival

Data from: National Fire Academy FESHE Model Curriculum Bachelor's (Core), February 2011.

It is difficult to gauge the impact of FESHE or the associate's and bachelor's model curricula on fire prevention in the United States, but it is safe to assume that without the NFA's training programs, both resident and hand-off, this text would never have been written. The limited number of positions in fire prevention bureaus leads to the strong probability that many senior chief officers will have little, if any, hands-on experience in fire prevention. The scope and subject matter of the courses included in the model curricula address the issue head on.

National Institute of Standards and Technology

In addition to identifying the need for a federal fire agency (the USFA) and the establishment of the NFA, the commission made seven recommendations for additional or expanded research by the National Bureau of Standards, a nonregulatory agency within the Commerce Department. The Federal Fire Prevention and Control Act, legislation that resulted from the commission's report, called for the establishment of the Center for Fire Research at the then-National Bureau of Standards.[27]

Fire research was not new to the National Bureau of Standards. The Bureau of Standards had been involved in technical fire research since 1914, when Congress funded research on fire-resistant construction materials. Obtaining "fundamental engineering data to serve as a basis for the revision and reconstruction of state and municipal building codes" was a stated goal in the establishment of the Bureau of

Standards' fire research laboratory in 1914.[28] The bureau has conducted fire tests and research continuously since that time.

Today, the agency is known as the National Institute of Standards and Technology (NIST), and its Building and Fire Research Laboratory (BFRL) carries on extensive testing and research activities in building materials performance, fire service technologies, fire loss reduction, and other fire-related areas Figure 2-7.

In the aftermath of the terrorist attacks on the World Trade Center (WTC), investigation of the WTC disaster became a funded program area. Research regarding the effectiveness of building and fire codes, structural fire response, occupant behavior and egress, and aircraft impact damage analysis is being conducted. The BFRL's mission is to "[m]eet the measurement and standards needs of the Building and Fire Safety Communities."[29]

Figure 2-7 Steel from the World Trade Center under test at NIST.

Official contribution of the National Institute of Standards and Technology; not subject to copyright in the United States.

National Construction Safety Team Act

On October 1, 2002, President George W. Bush signed the National Construction Safety Team (NCST) Act into law. The law authorized the NIST to establish teams to investigate building failures. The authority is patterned after the National Transportation Safety Board (NTSB) for investigating transportation accidents, and it resulted from the attacks on the Pentagon and WTC complex on September 11, 2001, and the ensuing construction failures.

During congressional hearings on the WTC disaster, witnesses identified critical failures in our system of building design and regulation and the lack of an effective organization to investigate such disasters. Victims' relatives and experts pressed for federal involvement beyond what was legally available in the immediate aftermath of September 11, 2001. The initial federal response was by the Building Performance Assessment Team (BPAT) of FEMA.

During testimony before the U.S. House of Representatives Committee on Science, Professor Glenn Corbett of John Jay College identified failures in the building performance assessment conducted in the wake of the WTC collapse.[30] However, the BPAT lacked the legal authority to conduct an actual investigation. Without legal authority, it was unable to seize and preserve evidence or compel witnesses to provide documents and testify under oath. Representative Sherwood Boehlert, chairman of the House Committee on Science, criticized the conditions that the BPAT members were forced to endure, stating, "We found that the study of the collapse had been hampered by bureaucratic confusion and delay; by a lack of investigative tools; and by excessive controls on the control of information."[31]

Due to the federal mandate to establish an effective investigative process, the NIST established the NCST. The NCST was pressed into service shortly after The Station nightclub fire in West Warwick, Rhode Island. The 2003 fire killed 100 people after fireworks ignited foam plastic soundproofing in the nightclub. The NCST is not limited to building failures due to fire; the team also investigated building failures in the aftermath of the EF5 tornado that devastated Joplin, Missouri, in May 2011; the damage

caused by hurricanes Katrina, Rita, and Sandy, which devastated coastal cities; and the collapse of the Dallas Cowboys' indoor practice facility that injured 12 players and coaches. Their reports and recommendations have resulted in improved building and fire codes, standards, and construction practices.

Tip

The National Construction Safety Team is patterned after the National Transportation Safety Board. The team was pressed into service shortly after The Station nightclub fire in West Warwick, Rhode Island.

Bureau of Alcohol, Tobacco, Firearms, and Explosives

The Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) is a law enforcement agency within the Justice Department charged with enforcing federal laws relating to alcohol, tobacco, firearms, explosives, and arson. The agency mission includes regulating the production and importation of alcohol; ensuring that taxes are collected on alcohol and tobacco products; and regulating explosives and firearms importation, manufacture, sales, and storage.

The bureau traces its roots to 1863, when Congress authorized the Treasury Department to hire personnel to serve as revenue agents and reduce the evasion of taxes on distilled spirits. The agency's colorful past includes destroying stills, chasing bootleggers, and successfully prosecuting Al Capone on tax evasion charges. Its mission was expanded to include firearms and explosives regulation and enforcement through congressional action. In January 2003, the agency was transferred to the Department of Justice by the Homeland Security Act of 2002 (Public Law No. 107-296).

The agency maintains the Arson and Explosives National Repository, a national collection center for information on arson and explosives-related incidents, and the National Integrated Ballistic Information Network, which provides equipment and support for state and local law enforcement in processing and evaluating gun crime evidence. The ATF's National Laboratory complex opened in 2003. Occupying a 35-acre complex in Ammendale, Maryland, the facility houses the Alcohol and Tobacco Laboratory, the Forensic Science Laboratory, and the new Fire Research Laboratory. The ATF laboratory system traces its history from 1886, when Congress established a Revenue Laboratory as part of the Department of the Treasury in 1887. Over time, the laboratory's responsibilities expanded to include the forensic analysis of firearms, explosives, fire accelerants, fire devices, and debris from explosives and fire scenes. The Fire Research Laboratory is tasked with conducting fire research and providing case support, training, and education in fire investigation.

The ATF initiates investigations and assists state and local agencies in the investigation of arson and bombings. Through its Certified Fire Investigator (CFI) program, the ATF has worked toward the application of scientific engineering and technology in the field of fire investigation. The ATF maintains a cadre of specially trained agents who are nationally certified to perform fire scene investigation and related law enforcement functions Figure 2-8. Stationed throughout the country, they are the only federal investigators trained by a federal law enforcement agency to qualify as expert witnesses in fire cause determination. The ATF uses computer fire modeling as a law enforcement tool, as an aid in the interview and interrogation process, and as a means of refuting the testimony of defense witnesses.

Tip

The ATF offers training in arson and explosives investigation for state and local investigators and prosecutors.

Through its Office of Training and Development, the ATF delivers in-depth training to members of state

Figure 2-8 ATF agents work and train with state and local agencies.

Courtesy of Duane Perry.

and local agencies charged with the investigation of arson and bombings. Its courses cover investigative and courtroom techniques in the areas of cause and origin, explosives and bombing investigations, and terrorism and explosives. It also offers training for prosecutors on successfully prosecuting arson.

The National Interagency Fire Center

On October 8, 1871, fire broke out in a barn in Chicago, starting what was to become the most famous conflagration in U.S. history. At least 300 people were killed, and more than 17,000 buildings were destroyed. The same day, a wildland fire burned more than 3,780,000 acres in Wisconsin and Michigan and killed five times as many people, but little is heard about the Peshtigo fire.

The Peshtigo fire was not an isolated incident. A wildland fire 23 years later destroyed Hinckley, Minnesota, and five surrounding towns, killing 418 people in Hinckley alone. There is a mass grave in the town cemetery with a white granite monument commemorating those who were unable to escape on the last train, which the engineer was forced to run through the fire in reverse in order to escape Figure 2-9. The town has been rebuilt, including the train station where the fire museum is located. On display are coins melted together that were once loose change in the pocket of a Hinckley resident.

Property loss, deaths, and injuries from wildland fires have always been significant problems in the United States. Vast areas of federally owned, undeveloped land spread from coast to coast and border to border. When fires occur and impinge on adjacent communities or threaten federal installations, action must be taken. During the 2002 fire season,

Figure 2-9 A monument marks the mass grave of the Hinckley fire victims.

© James Peacock/Emporis Images

approximately 88,458 fires burned almost 7 million acres. Suppression costs for federal agencies amounted to more than $1.6 billion.[32]

In 1965, the National Interagency Fire Center (NIFC) was formed in Boise, Idaho. The center is a cooperative effort among the Bureau of Land Management, Bureau of Indian Affairs, U.S. Forest Service, Fish and Wildlife Service, National Park Service, National Weather Service, Office of Aircraft Services, and National Association of State Foresters. All agencies are members of the National Wildfire Coordinating Group (NWCG), which was created in 1976 by the Secretaries of Interior and Agriculture to facilitate and develop common practices, standards, and training among the organizations.

A 1998 report from the NWCG indicated that 97 to 98 percent of annual wildland fires are extinguished during their first burning period, and that only 2.5 percent go on to become major disasters.[33] However, suppression costs of more than $1 billion annually and the human toll, including the deaths of 1,008 wildland fire fighters between 1910 and 2009 (including 34 fire fighters in 1994 alone), have proven to be more than can be justified. Fire prevention programs involving education, enforcement, and management of fire risk are used to reduce the threat of wildfires.

Research shows that wildfires caused by recreational campfires can be reduced by 80 percent through the use of patrols, user contacts, and signage. Fires caused by equipment and children can be reduced by 47 percent.[34] The NWCG agencies conduct public education programs, enforce federal and state fire and open burning laws, conduct fire investigations, and reduce fuel potential through prescribed burns and establishing fire breaks.

Tip

The NWCG's efforts have substantially reduced the threat of wildfires in recent decades.

U.S. Consumer Product Safety Commission

An independent regulatory agency, the U.S. CPSC was created by Congress in 1972 to protect the public against "unreasonable risks of injuries associated with consumer products." The agency develops standards; conducts research; informs and educates the public; and when necessary, recalls unsafe products. One of the National Commission on Fire Prevention and Control's recommendations in its 1973 *America Burning* report was for the newly created CPSC: "The Commission recommends that flammability standards for fabrics be given a high priority by the CPSC."[35] On November 8, 1974, the CPSC announced a consent order banning the sale of infants' and children's sleepwear that failed to meet the Standard for the Flammability of Children's Sleepwear.

The CPSC has issued recalls on hundreds of unsafe consumer items since that time. In 1998, the first recall of automatic sprinkler heads was announced, and 8.4 million Omega brand fire sprinklers were recalled after resolution of a federal lawsuit in which the CPSC's jurisdiction to issue the recall was challenged. Central Sprinkler Company contended that fire sprinklers were not "consumer items" and were outside the commission's jurisdiction.[36] Since then, the commission has ordered the recall of several problem sprinkler heads.

Tip

CPSC has ordered recalls of defective or potentially dangerous consumer items such as electrical appliances, heating appliances, and flammable clothing. The Omega recall was the first of several sprinkler head recalls involving multiple manufacturers.

Department of Housing and Urban Development

The Department of Housing and Urban Development (HUD) has had a significant fire safety impact

in residential and healthcare occupancies through its Minimum Property Standards (MPS). HUD and its predecessor, the Federal Housing Administration (FHA), have maintained the MPS since 1934. The MPS were developed to ensure that properties purchased with federally backed mortgages were constructed to minimum standards for quality, safety, and durability.[37]

Department of Defense

The fire prevention programs and efforts of the Department of Defense (DOD) are designed to protect the assets of the U.S. military and ensure the ability of its branches to carry out their missions. Unlike a private business concern that could be financially impacted, even to the point of insolvency, the DOD does not get the opportunity to seek reorganization or protection from the bankruptcy court. If a war is lost, so is the country.

The U.S. Army, Air Force, Navy, and Marine Corps have fire protection personnel at military installations worldwide. In addition to their fire suppression and crash-rescue duties, they perform fire inspections, develop and deliver fire safety education programs, investigate fires, and serve as fire safety consultants Figure 2-10. As federal fire fighters, they are employed by the organization they protect—a different arrangement from the employment of municipal fire fighters. Unlike municipal fire inspectors, DOD fire inspectors are often called on to help fix problems by providing technical assistance.

Tip

A municipal fire inspector who encounters a noncompliant fuel storage facility during an inspection will issue a notice of violation and follow up to ensure compliance. A DOD fire inspector will identify and note the unsafe condition and become part of the team that develops a strategy to address the violation and make the facility safe.

Figure 2-10 In addition to their fire suppression and fire prevention duties, Department of Defense firefighters serve as fire protection consultants for the U.S. military.

Courtesy of Chief Donald Warner.

With the passage of the National Technology Transfer Advancement Act of 1996, Congress mandated the use of consensus technical standards by federal agencies. In response, the DOD developed Military Handbook 1008, *Fire Protection for Facilities Engineering, Design and Construction*. The document established criteria for U.S. military installations worldwide, whether on government-owned or leased property. The document incorporated NFPA's *National Fire Codes*, portions of the International Conference of Building Officials' *Uniform Building Code*, and Factory Mutual's *Loss Prevention Data Sheets* and other standards.

In April 2003, Military Handbook 1008C was superseded by the *Unified Facilities Criteria, Design: Fire Protection Engineering for Facilities* (UFC). The document was amended in July 2009, February 2013, and March 2013. In implementing the UFC, the DOD updated its system of codes and standards to the most current developed by the model code and standards organizations. The UFC is distributed electronically and updated regularly. Updates are effective upon issuance. The Louis F. Garland Fire Academy is the DOD's fire training facility. Located at Goodfellow Air Force Base, Texas, the

academy delivers nationally accredited Fire Inspector II and III training for all four military services and the Defense Logistics Agency. The Fire Inspector I course is delivered through correspondence courses. The fire inspector course was originally developed by the Air Force in 1967, and it reduced fire losses Air Force-wide by an estimated 80 percent over the next 10 years.[38] In 1993, DOD adopted the DOD Fire Fighter Certification System, making fire inspector training and certification mandatory for all DOD fire fighters.

Occupational Safety and Health Administration

President Richard Nixon signed the Occupational Safety and Health Act in 1971, creating the Occupational Safety and Health Administration (OSHA). OSHA's mission is workplace safety. In 1970, there were more than 14,000 deaths from job-related injuries, and more than 2.5 million workers were disabled by workplace accidents or conditions. Since 1970, the rate of work-related fatalities has been reduced by half. Among other guidelines, OSHA issues standards for fire and explosion hazards and fire brigade staffing, training, and operation. OSHA's respiratory protection regulation 29 CFR 1910.134 (g) (4) is the basis for the two-in/two-out structural firefighting mandate. Twenty-two states and jurisdictions operate their own OSHA-approved plans, which cover both the private sector and state and local government employees. Four states—Connecticut, Illinois, New Jersey, and New York—along with the Virgin Islands have plans that cover public employees only.[39]

Centers for Disease Control and Prevention

The Centers for Disease Control and Prevention (CDC) has funded fire safety education and smoke alarm installation in high-risk communities since 1998. CDC defines high risk as having fire death rates higher than state and national averages and median household incomes below the poverty level.

CDC maintains statistics of fire deaths and injuries, and has developed public education programs that address at-risk groups such as seniors and young children. Their *Fire Spokesman's Pocket Media Guide* is a 22-page booklet of useful tips for fire department public information officers. Topics include developing sound bites, using statistics effectively, and interview techniques. The guide can be downloaded or ordered online. See Additional Resources at the end of this chapter for this and other CDC resources.

Other Federal Agencies

In addition to those previously mentioned, many federal agencies are either involved in fire research or have extensive fire prevention programs. The National Aeronautics and Space Administration (NASA) has conducted extensive research into fire safety within aircraft, aviation fuels, and other aviation and space-related issues. Nomex, used by the fire service for protective clothing, was the result of NASA research. The Department of State has fire prevention and protection personnel at its embassies worldwide. The Veterans Administration (VA) provides fire suppression and fire prevention services at VA hospitals across the United States.

WRAP-UP

Chapter Summary

- There are both public (government) and private organizations involved in the prevention of fires in the United States.
- The majority of fire prevention activities in the United States are performed by local fire departments and fire prevention bureaus.
- Early fire prevention bureaus enforced locally developed fire prevention regulations by performing inspections.
- Fire departments and fire prevention bureaus became involved in fire prevention education early in the 20th century.
- The first model fire prevention code was developed by the National Board of Fire Underwriters in 1930. It regulated hazardous conditions, similar to present-day fire codes.
- The earliest fire prevention ordinances authorized fire prevention bureaus to investigate the causes and origins of hostile fires.
- Not all fire departments have fire prevention bureaus. In some jurisdictions, traditional fire prevention bureau functions simply are not performed or are performed by another agency or agencies.
- State and territorial governments have fire prevention programs that provide code development, inspection, engineering services, and fire investigation services to the jurisdictions within the state/territory. The location of a state's fire prevention office will vary.
- Fire prevention has traditionally been considered the responsibility of the states and their political subdivisions. Federal involvement has generally been limited to the protection of government property and ensuring the continuity of government functions.
- Landmark events in the area of federal involvement in fire prevention include World War II, President Truman's 1947 Fire Prevention Conference, and the 1973 report of the National Commission on Fire Prevention and Control, *America Burning*.
- *America Burning* was the catalyst for the creation of the United States Fire Administration (USFA), the National Fire Academy, and the National Fire Data Center, and for federal focus on fire research for fire fighter safety.
- The National Construction Safety Team (NCST) Act authorized the National Institute of Standards and Technology (NIST) to investigate building failures, which has resulted in improved building and fire codes, standards, and construction practices.
- The Justice Department's Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) is charged with enforcing federal laws relating to alcohol, tobacco, firearms, explosives, and arson.
- The National Interagency Fire Center (NIFC) is a cooperative effort among members of the National Wildfire Coordinating Group (NWCG).
- The U.S. Consumer Product Safety Commission is charged with protecting the public from unsafe consumer products.
- The Department of Housing and Urban Development (HUD) has had a significant fire safety impact in residential and healthcare occupancies.
- The fire prevention programs and efforts of the Department of Defense (DOD) are designed to protect the assets of the U.S. military and ensure the ability of its branches to carry out their missions.
- The mission of the Occupational Safety and Health Administration is workplace safety.
- The Centers for Disease Control and Prevention maintains statistics of fire deaths and

WRAP-UP

injuries, and has developed public education programs targeting at-risk groups.
- Many other federal agencies are either involved in fire research or have extensive fire prevention programs, including the National Aeronautics and Space Administration (NASA), the Department of State, and the Veterans Administration (VA).

Key Terms

Fire protection system A system that detects fire or combustion products, suppresses or extinguishes fire, retards the passage of fire or smoke, or makes notification or alarm.

Model code A code developed by an organization for adoption by governments.

Ordinance Law of a political subdivision of a state.

Case Study

In his Executive Fire Officer (EFO) paper, *Utilization of Connecticut Department of Public Safety Fire Code and Building Code Personnel in Disaster Recovery*, Henry Paszczuk describes a study commissioned by the State of Texas in the aftermath of Hurricane Ike in September 2008. The study found that, following death and injuries, the public viewed damage to structures as the second-most-important measure of the scale of a disaster.

Damage assessments to structures and infrastructure must begin as soon as conditions are safe, though local officials are often overwhelmed by the scope of the task. In Florida, New Hampshire, and Virginia, the state fire marshals' offices assist with damage assessments after disasters. In the aftermath of Hurricane Ike, Texas municipalities recruited inspectors from other jurisdictions through mutual aid agreements.

Damage assessment surveys must be systematic and begin with the building exterior; the roof, including the mechanical systems and equipment; and then work down from the top floor to the basement. The survey's objective is to assess whether the building can be occupied immediately, may be occupied with minimal restoration, or must remain vacant until significant repairs are completed. Of the municipalities that Mr. Paszczuk surveyed, 71 percent identified fire/life safety code personnel as participants in damage assessments.

1. Which of the following organizations is likely best suited to develop damage assessment training for fire prevention personnel?

A. U.S. Consumer Product Safety Commission
B. Department of Defense
C. Bureau of Alcohol, Tobacco, Firearms, and Explosives
D. U.S. Fire Administration

2. Which state was NOT mentioned as assigning state fire marshal personnel to perform damage assessments?

A. Virginia
B. New York
C. New Hampshire
D. Florida

3. Which of the following is NOT part of a damage assessment survey?

A. Building exterior
B. Mechanical equipment
C. Telephone
D. Roof

4. Of jurisdictions that responded to the survey, how many assign fire/life safety code personnel to damage assessment teams?

A. 27 percent
B. 53 percent
C. 71 percent
D. 81 percent

Information for this case study came from: Henry Paszczuk, *Utilization of Connecticut Department of Public Safety Fire Code and Building Code Personnel in Disaster Recovery*. Available at: http://www.usfa.fema.gov/pdf/efop/efo44379.pdf

Review Questions

1. List four functions performed by traditional fire prevention bureaus.
2. What was the name of the 1973 report of the National Commission on Fire Prevention and Control?
3. What federal agency operated the Building and Fire Research Laboratory?
4. Which federal agency has employees that are trained and certified as certified fire investigators?
5. What is the name of the federal agency created as a result of the 1973 *America Burning* report?
6. What is one accomplishment of the National Construction Safety Team (NCST) Act?
7. Which federal agency is charged with protecting the public from unsafe consumer items?
8. Name two functions of the Centers for Disease Control and Prevention that pertain to fire and fire prevention.

Discussion Questions

1. Of the 90 recommendations of the National Commission on Fire Prevention and Control included in the *America Burning* report (see Appendix B), which three have had the greatest effect on you and your community?
2. In this chapter, specific events have been identified with the passage of laws or the development of fire prevention programs. What recent events could or should have led to new laws or programs? What new laws or programs would you recommend?
3. Is the federal government's role in fire prevention adequate or should more resources be allocated? What would be the effect if Congress were to abolish all federal fire programs and distribute the funds to the states for their fire prevention programs?

Additional Resources

In-depth information on many of the subjects discussed in this chapter can be found in the following texts and publications and at these websites.

America Burning (1973), *America Burning Revisited* (1987), and *America at Risk* (2000) are available from the U.S. Fire Administration at www.usfa.fema.gov

Bureau of Alcohol, Tobacco, Firearms, and Explosives, Fire Research Laboratory at www.atf.gov/labs

Center for Disease Control and Prevention at http://www.cdc.gov/HomeandRecreationalSafety/Fire-Prevention/index.html

DOD Firefighters (private website operated by Chief Donald Warner) at www.dodfire.com

National Association of State Fire Marshals at www.firemarshals.org

National Institute of Standards and Technology, Building Fire Research Laboratory at http://www.nist.gov/building-and-fire-research-portal.cfm

Fire and Emergency Services Higher Education (FESHE) Program at http://www.usfa.fema.gov/nfa/higher_ed/

National Interagency Fire Center (wildland firefighting) at www.nifc.gov/index.html

U.S. Consumer Product Safety Commission at www.cpsc.gov

U.S. Fire Administration at www.usfa.fema.gov

The 1966, 1976, 1986, 1996, and 2006 Wingspread Conference Reports are available at the National Fire Heritage Center website: http://thenfhc.org/library/national-fire-heritage-center-archives/reports/

End Notes

1. *On Guard, the Unsung Story of an Industry in War* (Washington, DC: National Bureau for Industrial Protection, 1946), page 14.
2. *Wartime Fires* (Boston: National Fire Protection Association, 1943), page 1.
3. U.S Fire Administration, *National Fire Department Census Quick Facts*. Available at: http://apps.usfa.fema.gov/census/summary.cfm
4. Powell Evans and J.C. Mallory, *Report of the First American National Fire Prevention Convention*, (Philadelphia: Merchant and Evans, 1914), page 151.
5. Peter Joseph McKeon, *Fire Prevention* (New York: The Chief Publishing Company, 1912), page 26.
6. Percy Bugbee, *Men Against Fire* (Boston: National Fire Protection Association, 1971), page 59.
7. McKeon, page 30.
8. *Fire Prevention Education* (National Board of Fire Underwriters: New York, 1942), page 11.
9. "Twenty-five Fatality Fire at Chicken Processing Plant, Hamlet, North Carolina, September 1991," Technical Report #057 (Emmitsburg, MD: U.S. Fire Administration, June 1999), page 9.
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12. Joseph Kendall Freitag, *Fire Prevention and Fire Protection as Applied to Building Construction* (New York: Wiley, 1912), page 118.
13. Gross, page 120.
14. Freitag, page 7.
15. Center for Safety Education, New York University and the Committee for Fire Prevention Education Representing Eleven National Educational and Fire-Safety, *Agencies and Organizations*, *Fire Prevention Education* (New York: National Board of Fire Underwriters, 1942), page 11.
16. Ibid., page 12.
17. *On Guard, the Unsung Story of an Industry in War*, page 6.
18. A.L. Todd, *A Spark Ignited in Portland, The Record of the National Board of Fire Underwriters* (New York: McGraw-Hill, 1966), page 216.
19. *On Guard, the Unsung Story of an Industry in War*, page 15.
20. Ibid., page 23.
21. *President's Conference on Fire Prevention Final Report* (Washington, DC: Federal Works Agency, 1947), page 4.
22. *America Burning, the Report of the National Commission on Fire Prevention and Control* (Washington, DC: National Commission on Fire Prevention and Control, 1973), page xi.
23. Ibid.
24. U.S. Fire Administration, *FY 2000 Accomplishments* (Emmitsburg, MD: U.S. Fire Administration, 2001).
25. *America Burning*, page 167.
26. U.S. Fire Administration, "About the Fire and Emergency Services Higher Education initiative." Available at: https://www.usfa.fema.gov/training/about_feshe.html

27. Gross, page 127.

28. Gross, page 120.

29. *Building and Fire Research Laboratory Activities, Accomplishments and Recognitions*, National Institute for Standards and Technology, April 29, 2014. Available at: http://fire.nist.gov/bfrlpubs/fire06/PDF/f06050.pdf

30. Statement of Professor Glenn P. Corbett, John Jay College of Criminal Justice Before the Committee on Science, House of Representatives, United States Congress, *Learning from 9/11: Understanding the Collapse of the World Trade Center*, March 6, 2002.

31. Stephen Barlas, "NIST and the WTC, Congress Pushes for a Tougher, More Thorough Investigation of WTC Collapse," *NFPA Fire Journal*, September/October 2002.

32. *Wildland Fire Statistics*, National Interagency Fire Center, 2003, page 2.

33. *Wildland Prevention Strategies*, National Wildfire Coordinating Group, 1998, page 9.

34. Ibid., page 10.

35. *America Burning*, page 168.

36. United States Consumer Product Safety Commission, *CPSC Docket 98-2 In the Matter of Central Sprinkler Corp., and Central Sprinkler Co.*, 1998, page 2.

37. National Institute of Building Sciences, *A Study of the HUD MPS for One- and Two- Family Dwellings and Technical Suitability of Products Programs*, March 2003, page i.

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CHAPTER 3

Private Fire Protection and Prevention Organizations

LEARNING OBJECTIVES

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

- Discuss the role of private industry in local, state, and national fire prevention efforts.
- List five industries and professions involved in fire prevention.
- Describe the role of the insurance industry in fire prevention and risk management.
- Describe the role of the design professional in fire prevention and protection.
- Describe the role played by industry trade associations in fire prevention and protection.

Case Study

In the September/October 2008 edition of *NFPA Journal*, Art Cote discusses NFPA Secretary John Wentworth's crusade to replace the "parlor" or "strike anywhere" match with the safety match. In 1907, NFPA's Committee on Matches determined that the only match the Association could recommend was the safety match, but little headway was made in the fight against parlor matches until 1909, when NFPA started its general education and publicity campaign. By 1912, NFPA had adopted a suggested model law and municipal ordinance prohibiting parlor matches. As a result, safety matches replaced "strike anywhere" matches as the most widely used match. Strike anywhere matches are still available, but are becoming harder to find due in large part to federal shipping regulations that regulate packaging (CFR 173.186 Matches). In this instance a private organization, founded and supported by the stock insurance industry, successfully campaigned for a cause that benefitted the insurance industry and the public at large.

1. Identify a current publicity campaign that promotes a safety issue that is not government sponsored.
2. What group(s) are behind the campaign?
3. Identify a fire safety issue that you think should be addressed through a publicity campaign.
4. What organization(s) should take the lead?

Information for this case study came from: Ron Cote, "Remembering Franklin Wentworth," *NFPA Journal*, September/October 2008.

We can do much to shape legislation that will benefit not only our own interests but the whole country, by securing such wise and salutary laws as might prevent the recurrence of other destructive conflagrations.

Henry A. Oakley **Figure 3-1**,
President, National Board
of Fire Underwriters, 1873

A.L. Todd, *A Spark Ignited in Portland* (New York: McGraw-Hill, 1966), page 26. Reprinted by permission of McGraw-Hill Education.

Introduction

There is often a tendency to question the motives of an organization whose primary objective is to turn a profit. But there are times when motive truly does not matter; intentions aside, the good deed still benefits the recipient. The best interests of business and the public are frequently identical. Public fire prevention programs would not exist as we know them without the efforts of private sector fire prevention organizations.

Figure 3-1 Henry Oakley called for the insurance industry to promote fire prevention legislation in 1873.

Reproduced from: Harry Chase Brearley, *Fifty Years of Civilizing Force* (New York: Frederick A. Stokes, 1916), page 52.

Tip

Private sector fire organizations have been instrumental in shaping today's public fire prevention programs.

In *Fifty Years of Civilizing Force*, Harry Chase Brearley described the first 50 years of the National Board of Fire Underwriters. Originally organized in 1866 to ensure uniform rates and commissions, the board failed in its original mission but went on to become perhaps the most powerful force for fire prevention and protection the United States has ever known. In describing the board's actions to strong-arm the city of Chicago into instituting fire prevention and protection reforms in 1874 under the threat of canceling every insurance policy in the city, Brearley stated: "This was public service of a high order—but, and herein lies its greatest value—its motives were those of practical business, not of altruism."[1]

Private fire prevention and fire protection programs generally fall into three categories: those undertaken by business as part of a risk management system; those that provide fire prevention and protection as a profit-making business service; and those that are not-for-profit, operating in the public interest. Often the roles, products, and missions of the organizations are complementary.

Fire Prevention Risk Management

Many early fire prevention efforts were undertaken by businesspeople who understood fire risk and wanted to reduce the chances of experiencing a catastrophic incident. In 1874, the first practical automatic sprinkler head was patented by Henry S. Parmalee of New Haven, Connecticut.[2] Parmalee was a piano manufacturer, and developed the sprinkler head for use in his factory. Edward Atkinson, sometimes called the father of fire protection engineering, was a New England cotton mill owner. Atkinson is credited with developing the tin-clad fire door and advocating the installation of sprinklers in New England mills.

Atkinson was one of the first to view fire prevention as a science. He studied fire causes and fire protection, and his mill became a model for fire prevention and protection. Atkinson went on to become president of the Factory Mutual insurance system, but not without controversy. Most mill owners were skeptical about sprinkler systems and opposed Atkinson's efforts to require their installation as a prerequisite for insurance. One is said to have advised him to "take a sprinkler head with him to the afterlife, for his own protection."[3]

Corporate Programs

Most large corporations have fire safety and fire prevention programs that are part of the corporation's risk management program. Security is most often under the same umbrella, and more often than not, the security director is also the safety director. In *Fire Safety and Loss Prevention*, a text developed for corporate safety and security officials, Kevin Cassidy identifies the conflicts that often arise between fire safety and security:

> As security/fire safety director . . . conforming to local laws can and will tie your hands. Security procedures will often be compromised in order to comply with mandated codes. It is crucial that you remind your organization that fire and building regulations are mandated, and compliance is required by law, whereas, most security regulations are not mandated.
>
> This article was published in Fire Safety and Loss Prevention, Kevin Cassidy, p. 8, Copyright Butterworth-Heinemann, 1992. Reprinted by permission of Elsevier.

Fire prevention bureau inspectors and supervisors are frequently approached by organizations with legitimate security concerns. A system that provides both is generally not the cheapest alternative, and fire department representatives will often

hear complaints that fire or building code requirements simply cannot be met and still provide adequate security. Achieving both is possible, but may be more expensive than simply providing adequate security measures and disregarding fire safety. Building owners, design professionals, and developers tend to take the least expensive route. Fire department personnel need to remember Cassidy's charge to his readers—fire safety regulations are mandated and have the force of law. Security does not. Inside the courtroom, the fact that customers were shoplifting will not justify management's decision to chain the rear exit doors closed.

Tip

Fire safety and security can and must be complementary.

Fire prevention, fire drills, and **fire brigade** training are all required as part of the overall fire safety plan mandated by model fire codes. The effectiveness of a well-planned and implemented program is starkly outlined in the U.S. Fire Administration's report *Chicken Processing Plant Fires, Hamlet, North Carolina and North Little Rock, Arkansas*.[4] Both fires occurred in 1991 and involved industrial cooking operations with similar equipment. In the North Carolina fire at Imperial Foods, 25 employees were killed and 54 were injured. The plant owner was imprisoned for code violations, and the plant never reopened after the fire.

In the North Little Rock fire at Tyson Foods, all 115 employees were evacuated within 3 minutes, assembled at a predetermined area outside the building, and accounted for by name. There were no injuries, and although Tyson employees were not able to extinguish the fire, plant fire brigade members in self-contained breathing apparatus met firefighters and led them to the fire. Tyson Foods used the downtime to remodel the plant and reopened in 13 weeks. What was the difference between the two incidents? Tyson Foods has a corporate fire safety policy that includes plant inspections, fire drills, and fire brigade training. Inspection reports are forwarded to corporate headquarters monthly. Semiannual fire drills are unannounced in order to simulate realistic conditions, and although the food products that are on the assembly line must be discarded to meet U.S. Department of Agriculture regulations, Tyson considers the cost as a normal business expense.

Insurance Industry Fire Prevention Programs

The insurance industry is responsible for much of the regulatory system used to prevent fires and reduce fire loss. The industry's contributions began with the early efforts of the stock insurance companies and the mutual companies that evolved among the cotton and woolen mills in New England, which are discussed in Chapter 1. The descendants of those organizations exist today, performing many of the same functions as they did in the 1800s.

Insurance Services Office, Incorporated

The National Board of Fire Underwriters was organized by stock insurance companies in 1866 in the wake of a conflagration in Portland, Maine. The board's original mandate was to regulate rates and commissions in an effort to reduce fierce competition within the industry. Competition led to rate cutting by unscrupulous or incompetent companies, which resulted in inadequate cash reserves. Without cash reserves to pay claims, many insurance companies declared bankruptcy in the wake of the conflagrations that plagued the country in the 1800s. Fire victims who were policyholders with the bankrupt companies went unpaid.

The board failed in its original mission of fixing rates but went on to become a huge actuarial