

LARGE-LOSS FIRES IN THE UNITED STATES-2011

Stephen G. Badger
November 2012



National Fire Protection Association
Fire Analysis and Research Division

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Acknowledgements

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National Fire Protection Association
One-Stop Data Shop
1 Batterymarch Park
Quincy, MA 02169-7471
www.nfpa.org
e-mail: osds@nfpa.org
phone: 617-984-7443

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Introduction

The summer of 2011 was the hottest summer on record in Texas, which was in the midst of a year-long drought. It was also the state's driest summer since 1895.

During the Texas fire season, which lasted from November 15, 2010, to October 31, 2011, the state experienced more than 30,000 wildfires that burned almost 4 million acres (1.6 hectares), more than in any previous year, and destroyed 2,966 homes, 1,639 of them in a single day. The fires also destroyed 2,411 other structures. From January 1 to October 31, alone, Texas firefighters fought more than 14,000 of these wildfires, which burned almost 3.4 million acres (1.4 hectares).

With so many fires and such great destruction, complete information or a tabulation of total losses is not available for the 2011 Texas wildfires. However, we do know that one of them, the Bastrop County Complex wildfire, was the largest of the large-loss fires of 2011.

The Bastrop County Complex wildfire broke out at about 2:20 p.m. on September 4 when power lines shorted out during high winds and sparks ignited dried grass and vegetation. The temperature that day was 98°F (37°C), winds were in excess of 45 miles (72 kilometers) per hour, and the relative humidity was 12 percent. By the time it was extinguished, it had burned 34,068 acres (12,787 hectares), destroyed 1,645 homes, and killed two people. This is the sixth time in the last 10 years that the largest-dollar-loss fire in the United States has been a wildfire.

NFPA reports annually on large-loss fires and explosions that occurred in the United States the year before. Such fires and explosions are defined as any event that results in property damage of at least \$10 million. Last year, according to the "Fire Loss in the United States During 2011" report that appeared in the September/October issue of *NFPA Journal*, U.S. fire departments responded to an estimated 1,389,500 structure and non-structure fires, which caused an estimated loss of \$11.7 billion. Many of these fires were small or resulted in little or no reported property damage. However, 22 of them resulted in losses of \$10 million or more each, for a total of roughly \$799 million in direct property losses. Although these fires accounted for only 0.002 percent of the estimated number of fires in 2011, they accounted for 6.9 percent of the total estimated dollar loss.

The number of large-loss fires annually has ranged from 16 to 45 over the past 10 years, with an average of approximately 24 fires per year. When adjusted for inflation to 2002 dollars, the number of fires in 2011 that could be categorized as large-loss fires—that is, fires resulting in a loss of \$10 million in 2002 dollars—drops to 13, with an adjusted loss of \$562 million in 2002 dollars.

In 2011, 11 fires resulted in more than \$20 million each in property damage. These costliest 11 fires, which include eight structure fires, two wildfires, and one outside fire with loss, resulted in a combined property loss of \$672.5 million, which represents 82.6 percent of the total loss in large-loss fires and 5.8 percent of the total fire losses in the United States for 2011. The Bastrop County Complex fire alone resulted in losses of \$400 million.

Where fires occurred

Seventeen of the 22 large-loss fires last year occurred in structures, resulting in a total property loss of \$293.9 million. Five non-structure fires—a yacht fire, a fire outside of structures with a loss, and three wildfires—resulted in losses of \$10 million, \$40 million, and \$455 million, respectively.

The Bastrop County Complex fire alone was responsible for 50 percent of the total loss in large-loss fires last year. During the past 10 years, wildfires have accounted for 30, or 13 percent, of the 236 large-loss fires, resulting in a total estimated loss of \$6.5 billion, or 53 percent of the reported losses. Of those 30 fires, nine resulted in a loss of more than \$100 million and two were responsible for a loss of more than \$1 billion. In eight of the last 10 years, at least one wildfire resulted in more than \$20 million in direct losses.

Of the 17 large-loss structure fires, seven occurred in manufacturing properties. These included a calcium carbide manufacturing plant, a fertilizer manufacturing plant, an adhesives manufacturing plant, a paper coating plant, a vehicle parts assembly plant, a food processing plant, and a chemical manufacturing plant. These seven fires resulted in total losses of \$130.5 million.

Four other large-loss fires occurred in store and office properties. One fire in a craft and hobby store resulted in a loss of \$15 million, and three office fires, including one in a medical office and treatment building, resulted in a combined loss of \$50 million.

Three fires occurred in industrial properties—a power generation plant, an optical laboratory, and an animal laboratory and research building—resulted in a combined loss of \$43.1 million. Two fires in storage properties—a fruit cold storage and a metal products warehouse—caused a combined loss of \$45.3 million. And one fire in a public assembly property—a church—resulted in a loss of \$10 million.

Information on the cause of the fire was reported for only 8 of the 17 structure fires. Three fires, all in store or office properties, were deliberately set and resulted in a loss of \$550 million, or 6.9 percent of large-loss structure fires of 2011. Two fires were the result of chemical reactions, one involving the use of a torch for roof work and one involving washing parts using flammable liquids, while another resulted when combustibles were placed too close to a recessed light fixture. The cause of only two of the six non-structure fires was reported. One resulted from an electrical short and the other from the spontaneous heating of agricultural products.

The operating status of the structure was reported for 16 of the structure fires. In 11 cases, the facility was in full operation. In four, the structures were closed. And in one, only security personnel were present. Five of the fires in structures broke out between 11 p.m. and 7 a.m. and resulted in a combined loss of \$63 million.

Detection and suppression systems

Information about detection equipment was reported for 15 of the 17 large-loss structure fires. Seven occurred in properties that had no automatic detection equipment, and the damage in these properties totaled \$115.8 million. Of the other eight structures, two had complete coverage smoke alarms, one had complete-coverage heat detection and smoke alarms, and five had detection systems of unreported type and coverage. Five of the eight systems operated effectively, while the operation or effectiveness of the other three was not reported.

Information about automatic suppression equipment was reported for all 17 structure fires. Seven of the structures had no suppression equipment and sustained a combined loss of \$119.4 million. Of the remaining 10, nine had wet-pipe sprinklers, three of which provided complete coverage and three of which provided partial coverage. The coverage of the other three was not reported. The tenth structure had a dry-powder system that provided local coverage.

Five of the 10 suppression systems operated, and three did not. Whether the other two operated was not reported. Of the systems that operated, one was not effective, and no reason for the failure was reported. Another was not in the area of ignition and was overwhelmed by the spreading fire. The third was overwhelmed by the volume of fire, the fourth was not adequate for the fire load, and the fifth system failed for reasons not given after about five minutes of operation. Of the three systems that failed to operate, two were not in the area of the fire. In the third, the fire was too small to activate the system, since it was confined to a large generator.

Complete information on both detection and suppression equipment was reported for 15 of the 17 large-loss structure fires. Both types of systems were present in eight structures. Two structures had only suppression equipment, but it is unclear if they operated. Five, or 29.4 percent, of the structures had neither a detection nor a suppression system. Property loss in these five fires came to more than \$73 million.

What we can learn

There were five more large-loss fires in 2011 than there were in 2010, and associated property losses increased by more than \$147.2 million, or 22.6 percent. In seven of the past 10 years, at least one fire has resulted in a loss of more than \$100 million, and in at least two years, one fire resulted in a loss of more than \$1 billion. Both of these fires were wildfires.

Adhering to the fire protection principles reflected in NFPA's codes and standards is essential if we are to reduce the occurrence of large-loss fires and explosions in the United States. Proper construction, proper use of equipment, and proper procedures in chemical processes, storage, and housekeeping will make fires less likely to occur and help limit fire spread should a fire occur, while proper design, maintenance, and operation of fire protection systems and features can keep a fire that does occur from becoming a large-loss fire.

Where we get our data

NFPA identifies potential large-loss incidents by reviewing national and local news media, including fire service publications. A clipping service reads all U.S. daily newspapers and notifies NFPA's Fire Analysis and Research Division of major large-loss fires. NFPA's annual survey of the U.S. fire experience is an additional data source, although not the principal one.

Once a fire has been identified, we request information about it from the fire department or agency having jurisdiction. We also contact federal agencies that have participated in investigations, state fire marshals' offices, and military sources. The diversity and redundancy of these data sources enable NFPA to collect the most complete data available on large-loss fires.

About the author

Stephen G. Badger is a fire data assistant in NFPA's Fire Analysis and Research Division and is a retired firefighter from the Quincy, Massachusetts, Fire Department.

Table 1.
Large-Loss Fires that Caused \$10 Million or more in Property Damage, 2002-2011

Year	Number of Fires	Number of Fires Causing \$10 million or more in 2002 Dollars	Direct Property Damage (in Millions)	
			As Reported	In 2002 Dollars
2002	25	25	\$562	\$562
2003	21	17	\$2,623	\$2,583
2004	16	10	\$337	\$276
2005	16	8	\$217	\$137
2006	16	14	\$380	\$359
2007	45	38	\$3,393	\$3,321
2008	34	25	\$2,322	\$2,230
2009	24	20	\$940	\$899
2010	17	11	\$652	\$590
2011	22	13	\$799	\$562

Note: Number of fires and unadjusted loss are based on data from studies that appeared in previous annual large-loss studies. Some of the information may differ from previously published material because material was updated after publication.

Note: Adjustment for inflation is based on the Consumer Price Index using 2002 as a base year. Note that adjustment for inflation not only reduces the total dollar loss for each year but also reduces the number of fires when adjusted losses large enough to qualify as large-loss fires.

Source: NFPA's Fire Incident Data Organization (FIDO)

Table 2.
Large-Loss Fires of \$20 Million or More in 2011

Incident and Location	Loss in Millions
Wildfire, Texas	\$400.0
Crop growing and storage, California	\$40.0
Wildfire, Texas	\$40.0
Plastic products storage, Texas	\$35.0
Chemical manufacturing plant, Kentucky	\$35.0
Vehicle parts assembly plant, Michigan	\$22.5
Power generation plant, California	\$20.0
Fertilizer manufacturing plant, South Carolina	\$20.0
Office building, Nebraska	\$20.0
Office building, North Carolina	\$20.0
Chemical manufacturing plant, Texas	\$20.0
Total Fires: 11	\$672.5

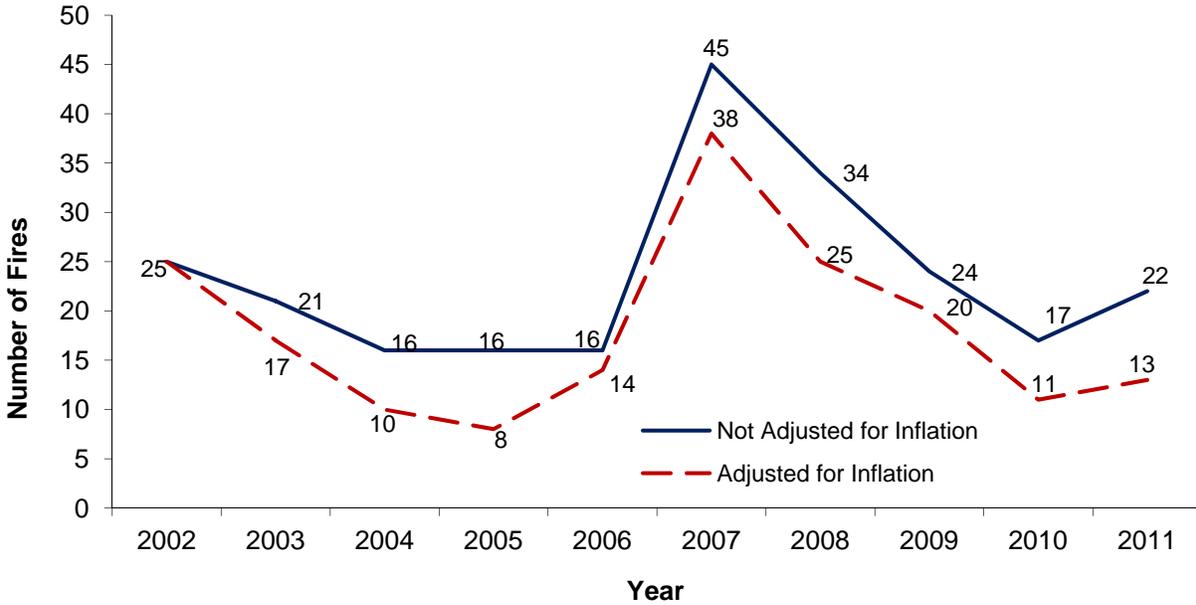
Source: NFPA's Fire Incident Data Organization (FIDO)

Table 3.
2011 Large-Loss Fires by Major Property Use Classification

Property Use	Number of Fires	Percent of Fires	Total Dollar Loss	Percent of Loss
Manufacturing	7	31.8%	\$130,500,000	16.3%
Basic Industry	4	18.2%	\$83,100,000	10.4%
Stores and Offices	4	18.2%	\$65,000,000	8.1%
Wildlands	3	13.6%	\$455,000,000	56.9%
Storage	2	9.1%	\$45,345,000	5.7%
Vehicle	1	4.5%	\$10,080,000	1.3%
Public assembly	1	4.5%	\$10,000,000	1.3%
Total	22	100.0%	\$799,025,000	100.0%

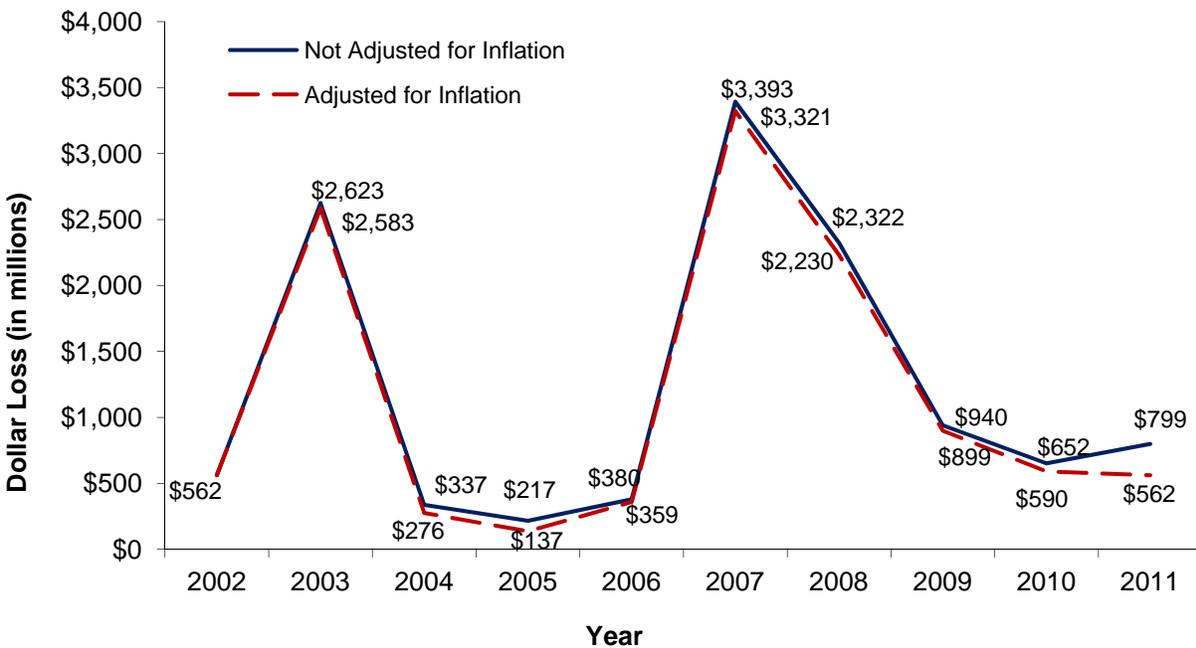
Source: NFPA's Fire Incident Data Organization (FIDO)

Figure 1
Large-Loss Fires, Unadjusted and Adjusted for Inflation, 2002-2011



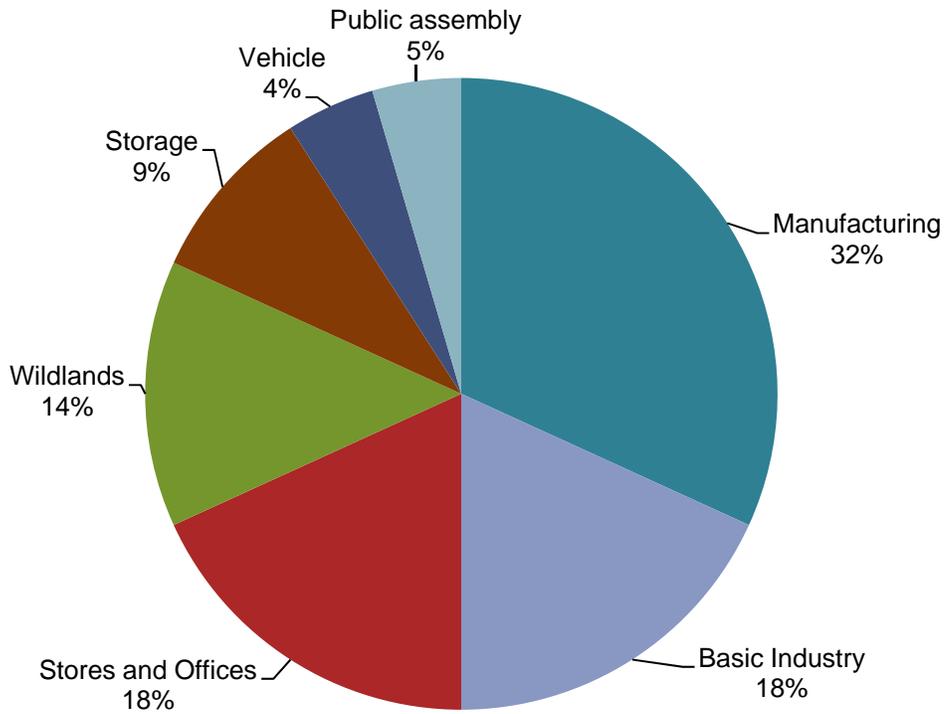
The inflation adjustment is based on the Consumer Price Index using 2002 as the base year.

Figure 2
Direct Dollar Loss in Large-Loss Fires, Unadjusted and Adjusted (2002-2011)



The inflation adjustment is based on the Consumer Price Index using 2002 as the

Figure 3
Large-Loss Fires by Major Property Use



2011 Large-Loss Fire Incidents

Manufacturing Properties

Kentucky

Date, Time of Alarm, Dollar Loss

March, 5:40 p.m., \$35 million

Property Characteristics and Operating Status

This was a five-story, 10,000-square-foot (929-square-meter) calcium carbide manufacturing plant of unprotected noncombustible construction. The plant was operating at the time.

Fire Protection Systems

No information was reported on any fire alarm systems. There was no automatic suppression system. A sprinkler system would not have been appropriate as the process involved the use of calcium carbide.

Fire Development

The cause of an internal explosion in a furnace during normal operation was undetermined.

Contributing Factors and Other Details

Two workers inside a control room died of injuries sustained in the explosion and fire.

Michigan

Date, Time of Alarm, Dollar Loss

March, 5 p.m., \$22.5 million

Property Characteristics and Operating Status

This was a one-story, 180,951-square-foot (16,811-square-meter) vehicle parts assembly plant of unprotected noncombustible construction. The plant was in operation at the time of the fire.

Fire Protection Systems

There was no automatic detection equipment. The partial coverage wet-pipe sprinkler system present did not protect the spray booth where the fire started, but it did activate as the fire spread outside the booth and overwhelmed the system.

Fire Development

The fire broke out in a spray booth. After an investigation, the cause was listed as undetermined.

Contributing Factors and Other Details

None reported.

South Carolina

Date, Time of Alarm, Dollar Loss

February, 6:47 p.m., \$20 million

Property Characteristics and Operating Status

This was a three-story, 160,000-square-foot (14,864-square-meter) fertilizer manufacturing plant of unprotected wood-frame construction. The plant was operating at the time.

Fire Protection Systems

There was no automatic detection equipment or automatic suppression equipment.

Fire Development

A fire of undetermined cause broke out in a break room. No additional information was reported.

Contributing Factors and Other Details

During this fire, an area of up to a ½-mile (0.8-kilometer) radius from the plant was evacuated. Mutual aid responded from a wide area to battle the blaze, as well as a structure fire and several small brush fires ignited by embers and flying brands.

Texas

Date, Time of Alarm, Dollar Loss

October, 10:40 a.m., \$20 million

Property Characteristics and Operating Status

This was a one-story, 102,749-square-foot (9,546-square-meter) chemical manufacturing building of unprotected noncombustible construction. The plant was operating at the time.

Fire Protection Systems

There was no automatic detection system present. A wet -pipe sprinkler protected the building, but it was not effective. There was no fire pump in the system to help with waterflow, and it is believed that 30 or more sprinklers opened and flowed water when hydrogen gas was ignited. Upon arrival, firefighters pumped water into the sprinkler system, but the system failed altogether after about five minutes. No reason was given for the failure.

Fire Development

A chemical reaction in the mixing area during manufacturing allowed a hydrogen gas cloud to form. It was then ignited by an unknown source.

Contributing Factors and Other Details

Workers evacuated the plant before firefighters arrived. During the fire, barrels of mineral oil ignited and ruptured, causing a flowing fire that destroyed a fire department aerial tower unit. The aerial tower unit was extended and in operation at the time, and could not be moved quickly enough to save it. Firefighters operating in the bucket were lowered to the ground and evacuated before the tower caught fire. Eleven fire departments responded. Damage to the structure was listed at \$10 million and damage to its contents at \$10 million.

Massachusetts

Date, Time of Alarm, Dollar Loss

March, 7:39 p.m., \$12 million

Property Characteristics and Operating Status

This was a three-story, 23,039-square-foot (2,140-squaremeter) adhesive manufacturing plant. The construction type was not reported. The plant was operating at the time.

Fire Protection Systems

Smoke alarms were present, as was a wet-pipe sprinkler system. Neither the coverage nor the operation of either system was reported.

Fire Development

At the time of the explosion, a chemical reaction process was underway during which a Class I flammable liquid solvent is added to a 4,000-gallon (15,142-liter) vessel containing polyester resin solution. A valve on a transfer line was inadvertently left open, resulting in the release of flammable acetone vapors, which were ignited by an undetermined source.

Contributing Factors and Other Details

Four workers were injured in the explosion. The Occupational Safety & Health Administration cited the company with 50 safety violations (not listed) and has fined the company. The state fire marshal's office also found several violations at the site. A state government news release with further information can be found at www.mass.gov/eopss/docs/dfs/news/press/20110831-bostik-middleton.pdf.

Ohio

Date, Time of Alarm, Dollar Loss

December, 3:56 a.m., \$11 million

Property Characteristics and Operating Status

This was a one-story, 20-foot-tall (6-meter-tall) paper coating plant that covered 42,372 square feet (3,936 square meters) and was of unprotected ordinary construction. The plant was operating at the time.

Fire Protection Systems

There was no automatic detection equipment or automatic suppression equipment.

Fire Development

This fire broke out as workers cleaned an eight-foot-long (2.4-meter-long) roller and spreader blade on a large paper coating process line using flammable ether with a flash point of 0oF (-18oC). Vapors were ignited by a static electric discharge. The fire spread rapidly, involving nearby combustibles, and traveled through the process line area into an adjoining portion of the building.

Contributing Factors and Other Details

The fire department listed factors contributing to fire growth and spread as, “the volume of rolled paper products in all spaces, an absence of automatic fire suppression system, [and] insufficient rated fire separation.” Damage to the structure was estimated at \$2 million, and damage to its contents was estimated at \$9 million.

California

Date, Time of Alarm, Dollar Loss

May, 5:30 a.m., \$10 million

Property Characteristics and Operating Status

This was a two-story, 22,500-square-foot (2,090-square-meter) food processing plant of unprotected ordinary construction. The plant was operating at the time.

Fire Protection Systems

A detection system was present, but its type, coverage, and operation were not reported. There was an automatic dry-chemical extinguishing system above the cooking oil tanks. The system operated, but it was not able to extinguish the large volume of fire.

Fire Development

An explosion in a cooking oil heating unit ignited a natural gas supply. No information was reported on factors contributing to the spread.

Contributing Factors and Other Details

The fire spread beyond the building of origin and did a reported \$5 million damage to the building and \$5 million in damage to its contents.

Industry Properties (Outside of Structure)

California

Date, Time of Alarm, Dollar Loss

February, 8:59 a.m., \$40 million

Property Characteristics and Operating Status

This was an outside crop growing area, with cultivated grains.

Climate

The temperature was 43oF (6oC), winds were from southeast at 15 miles (24 kilometers) per hour, and it was drizzling and misty.

Fire Development

The fire was caused by spontaneous heating of grain, spread to about 1 acre (0.4 hectares). It was not reported if this was stored or growing grains.

Contributing Factors and Other Details

Property damage was listed at \$5 million and damage to its contents at \$35 million.

Industry Properties

California

Date, Time of Alarm, Dollar Loss

January, 2:16 p.m., \$20 million

Property Characteristics and Operating Status

This was a three-story, 10,000-square-foot (929-square-meter) power generation plant of unreported construction type. The plant was operating at the time.

Fire Protection Systems

An unknown type of smoke detection system was present, but its coverage and operation was not reported. A wet-pipe sprinkler system was present, but it did not operate because the fire was too small and was confined to a generator.

Fire Development

The fire broke out in, and was confined to, a large generator.

Contributing Factors and Other Details

None reported.

Colorado

Date, Time of Alarm, Dollar Loss

July, 1 a.m., \$12 million

Property Characteristics and Operating Status

This was a one-story, 9,600-square-foot (892-square-meter) laboratory and research building of unprotected wood-frame construction. The lab was closed at the time of the fire.

Fire Protection Systems

No automatic detection or automatic suppression equipment was present.

Fire Development

The fire broke out in the ceiling when Class A combustibles placed too close to a recessed light fixture ignited, and the fire spread through the attic to the remainder of the building.

Contributing Factors and Other Details

One firefighter was injured. The structural loss was estimated at \$6 million. Damage to the contents was estimated at \$6 million.

California

Date, Time of Alarm, Dollar Loss

February, 9:22 p.m., \$11.1 million

Property Characteristics and Operating Status

This was a one-story, 10,000-square-foot (929-square-meter) optical laboratory building. The type of construction and operating status were not reported.

Fire Protection Systems

Investigators could not determine whether automatic detection equipment was present. There was no automatic suppression equipment.

Fire Development

The cause and origin of this fire was undetermined and is under investigation.

Contributing Factors and Other Details

This was one of five buildings in a compound that burned. Structure loss was estimated at \$100,000. Damage to its contents was estimated at \$11 million.

Stores and Office

Nebraska

Date, Time of Alarm, Dollar Loss

May, 11:05 p.m., \$20 million

Property Characteristics and Operating Status

This was a one-story, 170,000-square-foot (15,794-square-meter) office building of protected noncombustible construction. The building was closed for the night, but one employee was inside when the fire broke out.

Fire Protection Systems

There was no detection or automatic suppression system.

Fire Development

This incendiary fire was started in a cubicle using paper and a lighter.

Contributing Factors and Other Details

During their interior attack, firefighters faced heavy fire and smoke. The structural integrity of the building was compromised by cracks in the wall, forcing firefighters to evacuate the building. Soon afterwards, the fire breached the roof, and a collapse zone was formed.

North Carolina

Date, Time of Alarm, Dollar Loss

July, 12:28 p.m., \$20 million

Property Characteristics and Operating Status

This was a six-story, 20,000-square-foot (1,858-square-meter) medical office and treatment building of protected noncombustible construction. The offices were open and operating.

Fire Protection Systems

A complete coverage system of smoke alarms operated. A partial coverage wet-pipe sprinkler system was also present, but not in the area of the fire. Firefighters used a standpipe system.

Fire Development

This incendiary fire was set in an unoccupied office using a flammable liquid and an open flame. A return air plenum in the ceiling was missing dampers, allowing the fire to spread above the walls.

Contributing Factors and Other Details

The fire department reported that locked doors, extreme heat, and low visibility all contributed to a delay in attacking the fire. A firefighter who ran out of air during the fire and was trying to leave the building died, and nine others were injured. After a mayday was called, the downed firefighters were found and removed. All firefighters were then withdrawn from the building.

Texas

Date, Time of Alarm, Dollar Loss

October, 12:11 p.m., \$15 million

Property Characteristics and Operating Status

The status of this one-story, 90,000-square-foot (8,361-square-meter) craft store of unprotected ordinary construction not reported.

Fire Protection Systems

Smoke alarms of an unreported type were present. The system activated and alerted the occupants. A wet-pipe sprinkler system also operated, although it was not effective as it was not adequate for the building and contents.

Fire Development

This was an incendiary fire. The area of origin and method of ignition were not reported.

Contributing Factors and Other Details

The Bureau of Alcohol, Tobacco, and Firearms is investigating the fire, as well as the local fire department.

Iowa

Date, Time of Alarm, Dollar Loss

January, 3:17 a.m., \$10 million

Property Characteristics and Operating Status

This was a five-story, 20,000-square-foot (1,858-square-meter) office building of protected noncombustible construction that was closed for the night. The only occupant was a security guard.

Fire Protection Systems

More than one type of detection equipment was reportedly present and operated, although its types and coverage were not reported. There was also a wet-pipe sprinkler system. Its coverage was not reported, either, and investigators could not determine whether it operated. Firefighters used a standpipe system.

Fire Development

A fire of undetermined cause broke out in a fourth-story office cubicle.

Contributing Factors and Other Details

The structural loss was reported as \$7 million, and damage to contents at \$3 million. One firefighter was injured.

Wildfires

Texas

Date, Time of Alarm, Dollar Loss

September, 2:20 p.m., \$400 million

Setting

This was a wildland/urban interface fire.

Climate

The temperature was 98oF (37oC), winds were in excess of 45 miles (72 kilometers) per hour, and the relative humidity was 12 percent.

Origin and Path

High winds toppled trees onto power lines, causing the lines to come together, sending sparks into dry brush and grass in a vacant lot.

Contributing Factors and Other Details

Texas was experiencing a severe drought with very dry conditions, low humidity, and extreme fire danger. The fire destroyed 1,645 structures and burned 34,069 acres (13,787 hectares). Two civilians died, and three firefighters were injured during this fire. Large areas were evacuated during the blaze, which burned for more than a month. This was one of many large wildfires in the state at the time.

Texas

Date, Time of Alarm, Dollar Loss

April, \$40 million, 2:20 p.m.

Setting

This was a wildland/urban interface fire.

Climate

The temperature was 75 to 80oF (24 to 27oC) with winds of 30 to 40 miles (48 to 64 kilometers) per hour.

Origin and Path

High winds caused power lines to come together, sending sparks into dry brush and grass around an abandoned house.

Contributing Factors and Other Details

Texas was experiencing a severe drought with very dry conditions and low humidity. The fire destroyed 40 structures and burned 314,444 acres (127,251 hectares). Two firefighters were injured. Structural loss was listed at \$35 million, and damage to contents was estimated at \$5 million. This was one of many large wildfires in the state at the time.

Texas

Date, Time of Alarm, Dollar Loss

April, 2 p.m., \$15 million

Setting

This was a wildland/urban interface fire.

Climate

No information was reported.

Origin and Path

The cause and origin was undetermined.

Contributing Factors and Other Details

Texas was experiencing a severe drought with very dry conditions, low humidity, and high winds. The fire burned 40,575 acres (16,420 hectares). Structural loss was listed as \$10 million and damage to contents at \$5 million. This was one of many large wildfires in the state at the time.

Storage Properties

Texas

Date, Time of Alarm, Dollar Loss

February, 7:45 p.m., \$35 million

Property Characteristics and Operating Status

This was a 36-foot-high (11-meter-high), one-story structure shared by two companies. The fire broke out in a facility that stored empty soda and drink cans. The facility was closed to business, although one person was awaiting a pickup by a delivery service. The other part of the building was operating. The total area of both companies was 403,133 square feet (37,452 square meters). The construction method was not reported.

Fire Protection Systems

Smoke detection system and manual pull stations were present. The smoke alarms operated, alerting the lone occupant and an alarm company. A full-coverage wet-pipe sprinkler system operated but was not effective, as one section of the system was in a test mode and the other did not send a signal to the alarm company.

Fire Development

The cause and origin were undetermined.

Contributing Factors and Other Details

One firefighter was injured when pallets of empty cans collapsed on him.

California

Date, Time of Alarm, Dollar Loss

April, 3:30 p.m., \$10.3 million

Property Characteristics and Operating Status

This was a one-story, 45,000-square-foot (4,181-square-meter) fruit and produce storage building with cold storage of unprotected ordinary construction. The business was operating at the time

Fire Protection Systems

No automatic detection or suppression equipment was present.

Fire Development

Heat from a torch being used for roof work ignited combustible roofing materials, and the fire entered the structure through a hole in the wall, spreading to cork and foam insulation between wood structural members and to wooden ceiling components.

Contributing Factors and Other Details

A worker who smelled smoke in the cold storage area investigated by opening a compartment door and found heavy smoke. The front desk was told to call 911. When firefighters arrived and initiated an interior attack, they found the fire burning across the ceiling and heavy smoke inside. Their first attempt to reach the fire was unsuccessful as its seat was some 200 feet (61 meters) into the structure. They found product stored on wood pallets to a height of 20 to 30 feet (6 to 9 meters) and very tight access. Firefighters were withdrawn from the building and went to defensive operations. The fire burned and smoldered for three days.

Vehicle

Florida

Date, Time of Alarm, Dollar Loss

December, 6:27 a.m., \$10.08 million

Property Characteristics and Operating Status

This fire involved four large yachts docked at a marina. There were two occupants aboard the yacht where the fire broke out.

Fire Development

A fire of undetermined cause broke out in a 65-foot (20-meter) yacht.

Contributing Factors and Other Details

Upon arrival, firefighters found four yachts involved in fire. A 65-foot (20-meter) vessel was fully involved; an 85-foot (26 meter) and two 70-foot (21-meter) vessels were partially involved. As firefighters fought the fire with portable master stream devices and hand lines, one of the yachts was towed from its slip to prevent the fire from spreading down the line of docked boats. A mutual-aid fire boat fought the fire on that yacht. Two civilians aboard the yacht where the fire started were injured.

Public Assembly Properties

Connecticut

Date, Time of Alarm, Dollar Loss

November, 9:53 p.m., \$10 million

Property Characteristics and Operating Status

This was a large, two-story, 24,242-square-foot (2,252-square-meter) church. The steeple height was not reported. The sanctuary was an addition to the church and was separated by a fire wall.

Fire Protection Systems

A full-coverage heat and smoke detector system activated and alerted the fire department. A wet-pipe sprinkler system protected the new addition. However, it did not activate as the fire was confined to the older section of the church.

Fire Development

A fire of undetermined cause broke out in the attic and spread through the older section of the church.

Contributing Factors and Other Details

Firefighters initiated an interior attack upon arrival. Due to deteriorating conditions and the structural instability of the roof, which began to sag, firefighters were withdrawn to a defensive attack. Fire officials credited a good water supply, the fast response of mutual-aid companies, and a well-placed trench cut, as well as a fire wall, with saving a large part of the building.