

# **LARGE-LOSS FIRES IN THE UNITED STATES - 2004**

**Stephen G. Badger  
One-Stop Data Shop  
Fire Analysis and Research Division  
National Fire Protection Association**

**November 2005**



**National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471  
[www.nfpa.org](http://www.nfpa.org)**

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## Introduction

Each year, the NFPA reports on large fire and explosion losses in the United States, defined as events that resulted in property damage of at least \$5 million. In 2004, fire departments in the United States responded to a total of 1,550,500 fires. These fires caused an estimated loss of \$9.79 billion.<sup>1</sup> Many of them were small with little or no property damage reported; however 46 resulted in losses of \$5 million or more each.<sup>2</sup> Together, these large-loss fires resulted in \$ 524 million in direct property loss, and injured 17 firefighters and 16 civilians. Despite the fact that these fires accounted for only .003 percent of all the fires estimated to have occurred in the United States last year, they accounted for 5.4 percent of the total estimated dollar loss.

The direct property loss in large-loss fires for 2004 was down 81percent from the corresponding figure in 2003, when the loss was \$2.8 billion, and down 25 percent from 2002. The high losses in 2003 were primarily due to two wildland fires in California, where the combined loss was over \$2.0 billion.

Even before inflation adjustments, the number of large-loss fires in 2004 was tied as the second lowest total in the 10 years since 1995 (see Table 1 and Figure 1 and Figure 2).<sup>3</sup>When adjusted for inflation to 1995 dollars, the number of fires that occurred in 2004 that could be categorized as large-loss (i.e., loss of \$5 million in 1995 dollars) drops to 27, with a total adjusted loss of \$342 million. This is the lowest number of large-loss fires since 1995. The adjusted loss is still the lowest in the 10-year period and is 72percent lower than the 10-year average adjusted loss total.

The number of large-loss fires and explosions and the losses in these fires are volatile and has shown no consistent trend.

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<sup>1</sup> Michael Karter Jr. "Fire Loss In The United States During 2004," Abridged Report, June 2005.

<sup>2</sup> The 46 large-loss fires of 2004 are those for which losses were reported and verified.

<sup>3</sup> Figures for prior years are adjusted for late arriving information and so may not match previously published figures.

### **Costliest fire in 2004**

At 12:30 a.m., a fire broke out in a 240,000-square-foot automobile parts distribution center. The incendiary fire was set in rack-storage of parts, most of which were coated with protective petroleum based jelly. The fire spread quickly due to this coating, a lack of in-rack sprinklers, and strong winds. No other information on the presence of smoke detection equipment is available. There was a sprinkler system present that operated. The company website reported that the fire resulted in the loss of substantially all the facility's equipment and inventory. Since the fire, an employee has pled guilty to the crime and been sentenced to jail. No other information has been released by authorities.

This fire was just one of 16 fires that caused a loss of \$10 million or more in property damage last year (see Table 2). Together these 16 costliest incidents resulted in a combined loss of \$336.7 million. This represented 64.3 percent of the total dollar loss in the 46 large-loss fires for 2004, and 3.4 percent of the total US fire loss in 2004.

### **Where the fires occurred**

Large-loss fires occurred in every major property category except health care and correctional facilities (see Table 3 and Figure 3). Thirteen fires occurred in special properties, resulting in \$124.7 million in property loss. Eight large-loss fires occurred in residential properties, resulting in \$47.5 million in property loss. Seven fires occurred in manufacturing properties resulting in \$108.5 million in property loss. There were six fires in storage properties, resulting in \$138.8 million in property loss. There were three vehicle fires resulting in 30.0 million in property loss, and three fires in stores and office properties, two of which were stores and one in an office, resulting in 21.0 million in property loss, or \$10.0 and \$11.0 million respectively. There were two fires each in outside properties and educational properties, resulting in \$21.2 and \$13.6 million, respectively. There was one fire each in industrial and public assembly properties, resulting in \$10.8 and \$8.0 million, respectively.

Nearly all (41 of 46) of the large-loss fires for 2004 occurred in structures, with a combined loss of \$472.8 million. Two outside fires and three vehicles accounted for the rest of the fires. Twenty-one of the 41 structure properties were operating at the time of the fire, including 14 at full operation, two

partially operating, and five construction sites where work was ongoing. Another 14 were closed or had no one on the site. The operating status of the other six structures was not known or not reported.

Five of the 24 structure fires with known causes were intentionally set, as was the outside fire. These six fires accounted for 13 percent of last year's large-loss fires, and resulted in a combined property loss of \$47.9 million, or 9.1 percent of the loss in these large-loss fires.

Seventeen of the fires broke out between the hours of 11 PM and 7 AM. Twelve of these properties were unoccupied. Four were occupied to some extent and the operating status of the last one was not reported.

### **Detection and suppression systems**

Of the 41 structure fires, 16 were in properties that had no automatic detection equipment present. Some form of automatic detection equipment protected 16 properties, and it was not known or reported if the other nine properties had any detection equipment at all. This means that 50 percent of the properties for which the presence of detection equipment was known had some type of automatic detection system.

Of the 16 structures that were protected by a system of automatic detection, five had complete coverage - four by smoke detection equipment and one by an unreported type system. Three properties had partial coverage by automatic detection equipment -- two by smoke detectors and one by heat detection. The extent of coverage of detection equipment in the other eight properties was not reported -- seven were smoke detection system and one was not reported.

Ten of the 16 systems operated. Two did not operate; one because of dead batteries and one system was missing batteries. The operation of the other four systems was not reported.

Of the 41 structures involved in large-loss fires in 2004, only 10 were known to be equipped with automatic suppression equipment. Twenty-five definitely had no automatic suppression equipment, and it is not known or was not reported whether the other six properties had any type of suppression equipment present. This means that only 29 percent of the structures for which the presence of automatic suppression equipment was known were equipped with some sort of system.

Six of the 10 protected properties had complete coverage sprinkler systems. Four had a wet-pipe system, one had a dry-pipe system, and one had unknown type system. One property had partial sprinkler system coverage of an unreported type. The extent of coverage for three was not reported. One had a wet-pipe sprinkler system, and two systems were not described.

Suppression systems operated in four of the 10 properties protected; and four systems did not operate. The operation of the last two systems was not known or not reported. One of the systems that operated was effective in controlling or extinguishing the fire. Three systems were ineffective due to, respectively, being inadequate water flow, being overpowered by the fire spread, and inability to reach the seat of the fire. (The last was effective in controlling the fire spread.) Of the four that did not operate, two systems had not yet been completely installed and so were not operational, one system had been shut down prior to the fire because of a leak, and one was damaged in an explosion.

A look at Table 4 shows that of the 32 structures for which the presence of systems both detection and suppression systems was fully reported, four had detection and suppression systems, five had just an automatic suppression system. Three of these five structures were under construction with the system installed but not yet operational, and one was operational but shut down due to a leak. Twelve had just an automatic detection system, and 11 had neither. Six of these 11 structures were under construction and not yet at the stage where these systems could be installed.

### **What we can learn**

In 2004, the number of large-loss fires fell by two, and the direct property loss was comparable to 2003 except for the two unusually large losses in two wildland fires. In eight of the past 10 years, 1995 to 2004, there had been at least one fire with direct property loss in excess of \$100 million. In 2004, there was one fire with a loss of \$100 million, or 19.1 percent of the total large loss fire loss. In three of the past ten years has there been a billion dollar loss fire. This was not one of those years.

Each year the large-loss fire study reports on the fraction of fires accounting for major losses that occurred in properties both protected and not protected by automatic detection or suppression systems. Each year a large fraction of large-loss fires are reported in properties with no such protection, with only partial protection, or with systems rendered ineffective by actions or omissions before fire began. Such was the case again this year. Initial explosions or structural collapse also

sometimes damage a system to the point of being inoperable or ineffective, and sometimes systems were installed but not yet completed.

Adherence to the fire protection principles reflected in NFPA's codes and standards is essential if we are to continue reducing the occurrence of large-loss fires and explosions in the United States. Human error or negligence is a major contributing factor in today's fires, but proper design, maintenance and operation of fire protecting systems and features can keep a fire that starts through human error from becoming a large-loss fire. Reducing the risk of explosions is also important. Proper construction, storage methods, and housecleaning will make fires less likely and help control or limit the fire spread if fire occurs.

### **About the author**

Stephen G. Badger is a member of the NFPA Fire Analysis and Research Division, and is also a retired firefighter from the Quincy, Massachusetts Fire Department.

### **Where we get our data**

The NFPA collects its data by reviewing national and local news media, including fire service publications. A clipping service reads all U.S. daily newspapers and notifies the NFPA's Fire Analysis and Research Division of major large-loss fires. The NFPA's annual survey of the U.S. fire experience is an additional data source, although not the principal one. We also contact federal agencies that have participated in investigations, the state fire marshal's offices, and military sources. Once an incident has been identified we request information from the fire department or the agency having jurisdiction. The diversity and redundancy of these data sources enables the NFPA to collect the most complete data available on large-loss fires.

### **Acknowledgments**

The NFPA thanks the U.S. fire service for its contributions of data, without which this report would not be possible. In many cases the fire departments were unable to contribute information to the NFPA because legal action is pending or ongoing, or they are unable to determine many pieces of information we need to make our study as complete as possible. The author wishes to thank Norma Candeloro for providing the support this study requires.



**Table 1**

**Large-Loss Fires that Caused \$5 Million or More in Property Damage, 1995 - 2004**

<b>Year</b>	<b>Number of Fires</b>	<b>Number of Fires Causing \$5 million or More in 1995 Dollars</b>	<b>Property Loss and Large Loss Threshold (unadjusted)</b>	<b>Property Loss and Large Loss Threshold In 1995 Dollars</b>
1995	44	44	1362	1362
1996	63	55	1544	1461
1997	57	42	885	769
1998	57	46	1167	1039
1999	67	55	2285	2036
2000	65	51	2029	1732
2001*	53	40	978	784
2002	46	38	698	556
2003	48	36	2785	2252
2004	46	27	524	342

\* Excluding the 9/11/01 World Trade center Incident from the loss totals but not the fire incident totals.

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 1995 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 \$10 Million or More in 2004**

<b>Incident and Location</b>	<b>Loss in Millions</b>
Automobile parts storage, Tennessee	100.00
Chemical manufacturing, Georgia	50.00
Apartment building under construction, Nebraska	40.00
Dairy products manufacturing, Minnesota	15.00
Saw mill, Ohio	15.00
Aircraft, Colorado	12.00
Vehicle and highway overpass, Connecticut	11.20
Building under construction, Texas	11.00
Store, Georgia	11.00
Electric power plant, Hawaii	10.75
Storage, Washington	10.50
Electronics equipment storage, Minnesota	10.25
Manufacturing plant, California	10.00
Building under construction, California	10.00
Aircraft, Minnesota	10.00
Storage, Utah	10.00
Total - 16 Fires	\$336.70

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

**Table 3**  
**Large-Loss Fires by Major Property Use Classification**

<b>Property Use</b>	<b>Number of Fires</b>	<b>Percent of Fires</b>	<b>Total Dollar Loss</b>	<b>Percent of Loss</b>
Special Properties	13	28%	\$124,700,000	23.8%
Residential	8	17%	\$47,500,000	9.1%
Manufacturing	7	15%	\$108,501,000	20.7%
Storage	6	13%	\$138,750,000	26.5%
Vehicles	3	7%	\$30,010,000	5.7%
Stores and Offices	3	7%	\$21,000,000	4.0%
Outside fires	2	4%	\$21,200,000	4.0%
Educational	2	4%	\$13,572,000	2.6%
Industry	1	2%	\$10,750,000	2.1%
Public Assembly	1	2%	\$8,000,000	1.5%
Totals	46	100%	\$523,983,000	100.0%

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

**Table 4**  
**2004 Large-Loss Incidents**

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**SPECIAL PROPERTIES**

**Nebraska**

**Dollar Loss:** \$40,000,000

**Month:** January

**Time:** 11:30 p.m.

**Property Characteristics and Operating Status**

This nine-story 100-plus-unit apartment building was of heavy-timber construction and covered 205,000 square feet. The building was under construction at the time. No one was at the site when the fire broke out.

**Fire Protection Systems**

There was no smoke detection equipment present. There was a wet pipe sprinkler system installed but it was not yet operational. The coverage of the system was not reported.

**Fire Development**

During the day, workers had used cutting tools in an elevator shaft on the ninth story. An ember fell into a pile of construction debris where it smoldered unnoticed. After workers had left for the day, the fire broke out and was discovered by a person in an adjacent building. Upon arrival, firefighters found fire on the ninth-story and roof of the structure. The fire spread latterly across the upper floors and vertically via the elevator shaft and when an upper floor collapsed.

**Contributing Factors and Other Details**

Firefighters halted an initial interior fire attack which proved unable to cope with the large volume of fire on the upper stories.

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**Texas**

**Dollar Loss:** \$11,000,000

**Month:** August

**Time:** 5:56 p.m.

**Property Characteristics and Operating Status**

This four-story 100-unit apartment building was of unprotected wood-frame construction covering 32,000 square feet. The building was under construction at the time. Some workers were at the site when the fire broke out.

**Fire Protection Systems**

There was no detection equipment yet installed. There was a complete coverage wet-pipe sprinkler present but it was shut down before the fire due to a leak in the system.

### **Fire Development**

A fire of unknown cause broke out on the second level of the building. Wind helped spread the fire throughout the units in the section of the building that was still in the framing phase. The fire spread to a parking garage then ignited a structure on the opposite side of the street.

### **Contributing Factors and Other Details**

Despite openings not yet protected by fire-rated doors, fire walls were effective in limiting the spread of fire. Two firefighters were injured.

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### **California**

**Dollar Loss:** \$10,000,000

**Month:** January

**Time:** 7:29 p.m.

### **Property Characteristics and Operating Status**

The structure was under construction; no other information was reported.

### **Fire Protection Systems**

No information reported.

### **Fire Development**

This incendiary fire was set on the second-story. No other information was reported.

### **Contributing Factors and Other Details**

No information reported.

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### **Kansas**

**Dollar Loss:** \$8,500,000

**Month:** March

**Time:** 2:22 a.m.

### **Property Characteristics and Operating Status**

This four-story senior citizen center was of unprotected wood-frame construction and covered 144,000 square feet. The building was under construction and no one was on the site at the time of the fire.

### **Fire Protection Systems**

There was no automatic smoke detection or suppression system present.

### **Fire Development**

This incendiary fire was set on the first-story using available materials. Openings in the construction and doors left open contributed to the fire's spread. This was the second fire at this building in two days, and one of a series of arson fires in the area.

### **Contributing Factors and Other Details**

One firefighter was injured. Loss to the structure was estimated at \$8,000,000 and \$500,000 to the contents.

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**Maryland**

**Dollar Loss:** \$8,000,000

**Month:** November

**Time:** 8:25 a.m.

**Property Characteristics and Operating Status**

This three- and four-story historic courthouse was of unprotected ordinary construction. The ground floor area was not reported. Part of this building was undergoing renovations. In that section there were construction workers on site. The newer section of the courthouse was open and partially operating with workers arriving for the day.

**Fire Protection Systems**

There was an automatic detection system present. The type and coverage were not reported. The system activated. There was a sprinkler system present, but no information was reported on it.

**Fire Development**

The fire broke out in temporary lighting in the attic area of the section undergoing renovations. The exact ignition sequence was not reported.

**Contributing Factors and Other Details**

Firefighters successfully battled to keep the fire from extending horizontally to the newer section of the courthouse.

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**Minnesota**

**Dollar Loss:** \$7,400,000

**Month:** December

**Time:** 12:14 a.m.

**Property Characteristics and Operating Status**

This four-story 140-unit apartment building was of unprotected wood frame construction and covered 200,000 square feet. The building was under construction at the time. No one was at the site when the fire broke out.

**Fire Protection Systems**

There was no automatic detection or suppression equipment present.

**Fire Development**

A police officer on patrol smelled smoke checked the area and found heavy smoke coming from an apartment complex under construction. An incendiary fire had been set in a room on the second-story in the center of the building. Fire was able to spread rapidly throughout the structure due to its being in the framing stage.

**Contributing Factors and Other Details**

Police officers pulled a fire alarm and evacuated a nearby occupied apartment building.

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**Maryland**

**Dollar Loss:** \$7,000,000

**Month:** December

**Time:** 4:54 a.m.

**Property Characteristics and Operating Status**

Fires were set in over two dozen single-family dwellings of unprotected wood-frame construction. The homes were under construction at the time. No one was at the site when the fire broke out.

**Fire Protection Systems**

No information on detection equipment or suppression equipment was reported.

**Fire Development**

These incendiary fires were set in multiple areas and involved multiple materials.

**Contributing Factors and Other Details**

Fires were set in or spread to 41 homes, destroying at least 10 and severely damaging 16 of them. The homes were in various stages of construction. Multiple fires stretched firefighting resources thin, requiring mutual aid from several areas.

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**Virginia**

**Dollar Loss:** \$6,000,000

**Month:** March

**Time:** 12:33 p.m.

**Property Characteristics and Operating Status**

This five-story apartment building was of unprotected wood-frame construction. The ground floor area was not reported. The apartment building was under construction at the time of the fire. Construction workers were on the site at the time.

**Fire Protection Systems**

There was no detection equipment or suppression equipment present.

**Fire Development**

This fire of unknown cause originated in a trash chute near the second-story. Fire spread rapidly up the chute and spread to the walls of the building. When the roof collapsed, polystyrene roof insulation fell into the fire and soon became flying burning embers that spread the fire to at least 25 other structures and 20 vehicles over a 20-block area.

**Contributing Factors and Other Details**

Damage to structures and vehicles is estimated to be at least \$6 million, with the tally still ongoing. One civilian injury was reported.

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**Texas**

**Dollar Loss:** \$6,000,000

**Month:** September

**Time:** 2:19 a.m.

**Property Characteristics and Operating Status**

This two-story former brewery was of heavy timber construction and covered 40,000 square feet. At the time of the fire, the building was undergoing renovations. No one was at the site when the fire broke out.

**Fire Protection Systems**

No information was reported on automatic detection or suppression equipment.

**Fire Development**

No information could be determined other than that the fire began on the first story.

**Contributing Factors and Other Details**

Damage to the structure was estimated at \$5,000,000 and \$1,000,000 to the contents.

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**Massachusetts**

**Dollar Loss:** \$5,800,000

**Month:** May

**Time:** 11:45 a.m.

**Property Characteristics and Operating Status**

This three-story 48-unit apartment building was of unprotected wood-frame construction and covered 9,000 square feet. The building was under construction at the time of the fire, and workers were at the site.

**Fire Protection Systems**

There was no automatic detection equipment or suppression equipment present.

**Fire Development**

The only information reported was that the fire began in palletized materials and spread rapidly throughout the structure. Upon arrival, firefighters found the building totally involved in fire.

**Contributing Factors and Other Details**

Gusting winds helped spread the fire throughout the building. Two firefighters were injured.



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**Washington**

**Dollar Loss:** \$5,000,000

**Month:** August

**Time:** 12:58 a.m.

**Property Characteristics and Operating Status**

This four-story combination commercial and apartment building covered 6,000 square feet. The type construction and number of units were not reported. The building was under construction at the time and no one was at the site.

**Fire Protection Systems**

There was no automatic detection equipment present. There was a sprinkler system present, but it was not yet operational. The coverage was not reported.

**Fire Development**

This incendiary fire was set on the fourth-story.

**Contributing Factors and Other Details**

This fire was one of several in the area within days. The fire caused \$4,500,000 in damage to the original building and \$500,000 damage to exposed buildings.

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**Illinois**

**Dollar Loss:** \$5,000,000

**Month:** August

**Time:** 5:25 a.m.

**Property Characteristics and Operating Status**

This three- and four-story vacant steel products warehouse was of protected ordinary construction and covered 120,000 square feet. No one was at the site when the fire broke out.

**Fire Protection Systems**

There was no automatic smoke detection or suppression system present.

**Fire Development**

A fire of undetermined origin broke out on the fourth-story. No other details were reported.

**Contributing Factors and Other Details**

One firefighter was injured.

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**Idaho**

**Dollar Loss:** \$5,000,000

**Month:** November

**Time:** 4:41 a.m.

**Property Characteristics and Operating Status**

This two-story apartment building was of unprotected wood-frame construction and covered 8,736 square feet. The building was under construction and there was no one at the site when the fire broke out.

**Fire Protection Systems**

There was no automatic smoke detection equipment or suppression system present.

**Fire Development**

Cardboard boxes of sheet rock mud were placed next to a portable propane heater on the first-story. Once the boxes ignited, the fire compromised the fuel line to the heater. Fuel was released and ignited and the fire spread to an adjoining garage containing other building materials.

**Contributing Factors and Other Details**

Upon arrival, firefighters found the building of origin fully involved with fire and direct fire impingement on a 1,000 gallon propane tank located outside in the rear of the structure. Firefighters provided protection for the threatened tank and exposures. One firefighter was injured. Loss to the structure was estimated at \$4,500,000 and \$500,000 to the contents.

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**RESIDENTIAL****Wyoming**

**Dollar Loss:** \$8,000,000

**Month:** March

**Time:** 3:33 p.m.

**Property Characteristics and Operating Status**

This two-story college dormitory was of protected noncombustible construction. The ground floor area was not reported. The dorm was occupied.

**Fire Protection Systems**

There was a system of automatic smoke detection equipment present. The coverage was not reported but the system did operate. There was no suppression system present.

**Fire Development**

An overheated power-strip plug (relocateable power tap) on a wall heated the wall fastenings to a point of failure. The relocateable power tap fell to the floor at the end of the bed and continued to heat and ignited nearby combustibles. The fire was contained to the upper floor.

## **Contributing Factors and Other Details**

Four students were treated at the hospital for smoke related injuries.

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### **Maryland**

**Dollar Loss:** \$7,000,000

**Month:** March

**Time:** 5:00 p.m.

### **Property Characteristics and Operating Status**

This two-story single-family home was of protected wood-frame construction and covered 14,000 square feet. The home was occupied at the time of the fire.

### **Fire Protection Systems**

There was a complete coverage smoke detection system present in the house, all levels and sleeping areas were covered. There was no detection equipment in the garage, where the fire originated. It is not known if the system activated in the house. There was no suppression system present.

### **Fire Development**

Juveniles playing with matches ignited newspapers in the garage. A cardboard box was used to smother and extinguish the fire. Not realizing that the box was burning, the juveniles placed it in a trash pile in the garage and went into the house. Upon leaving the house about 20 minutes later, they found the garage well-involved with fire. Upon arrival, firefighters found that the fire had spread into the attic of the house.

## **Contributing Factors and Other Details**

No one met the firefighters upon their arrival, so crews began searching the house for possible occupants in need of rescue, which delayed their initial suppression activities. This house was in a rural area with no municipal water supply.

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### **Maine**

**Dollar Loss:** \$6,000,000

**Month:** March

**Time:** 12:25 p.m.

### **Property Characteristics and Operating Status**

This 3-1/2-story seasonal mansion-style home was of unprotected wood-frame construction and covered 7,000 square feet. The house was built in the early 1900's and was situated on a rise overlooking the ocean.

### **Fire Protection Systems**

There was a partial coverage system of smoke alarms present. The locations of the alarms were not reported. The system did activate and alerted workers who were present at the time. No suppression system was present.

### **Fire Development**

Workers were removing paint with an electric heat gun. The heat ignited wood behind shingles at the second-story level on the ocean side of the home. The fire burned up the inside of the wall to the attic and roof area.

### **Contributing Factors and Other Details**

Balloon construction allowed the fire to spread in the wall space. Forty-mile-per-hour winds off the ocean also enhanced the fire spread throughout the structure. Damage to the structure was listed as \$5,500,000 and \$500,000 to the contents.

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### **Georgia**

**Dollar Loss:** \$6,000,000

**Month:** April

**Time:** 7:27 a.m.

### **Property Characteristics and Operating Status**

This three-story town house apartment building (seven to twenty units) was of unprotected wood-frame construction. The ground floor area was not reported. Several units were occupied at the time of the fire.

### **Fire Protection Systems**

There was a smoke detection system present. The coverage was not reported but the system did activate. There was no suppression system present.

### **Fire Development**

A grass fire ignited this structure. The cause of the grass fire has not been determined. The fire spread vertically up the structure. The fire reached and eventually spread throughout the attic area. The fire also spread laterally via the floor joist system to several units.

### **Contributing Factors and Other Details**

When the fire department arrived, the structure was heavily involved in fire. Accessibility in the rear was a problem due to a hill. Two civilians were injured when they jumped from balconies. Loss to the structure was placed at \$4,000,000 and to the contents at \$2,000,000.

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### **Massachusetts**

**Dollar Loss:** \$5,500,000

**Month:** April

**Time:** 8:22 p.m.

### **Property Characteristics and Operating Status**

This 2 ½-story single-family home was of unprotected wood-frame construction and covered 5,000 square feet. The home was occupied, with residents located on the first-story.

### **Fire Protection Systems**

There was a partial coverage smoke detection system present. Alarms were located in the second-story hallway. There were no alarms in the area of origin (the attic) but alarms did activate. There was no suppression system present.

### **Fire Development**

Electrical equipment above a recessed light in a second-story bedroom malfunctioned and ignited wood structural members. The fire spread undetected in the large open attic area for some time before detection. Arriving firefighters found heavy fire conditions throughout the attic.

### **Contributing Factors and Other Details**

Lack of detection equipment in the attic allowed the fire to burn undetected. The damage was listed as \$3,100,000 to the home and \$2,400,000 to contents.

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### **Nevada**

**Dollar Loss:** \$5,000,000

**Month:** September

**Time:** 3:00 a.m.

### **Property Characteristics and Operating Status**

This three-story 16-unit apartment house was of protected ordinary construction and covered 1,400 square feet. Apartments were occupied at the time.

### **Fire Protection Systems**

In the apartment of fire origin, there was complete coverage by smoke alarms. The alarms had no batteries. (No information was reported on the rest of the building.) There was no suppression system present.

### **Fire Development**

The cause of the fire is listed as undetermined.

### **Contributing Factors and Other Details**

The roof collapsed during the fire, forcing the fire department to go to a defensive attack and protect the exposures. One firefighter suffered a broken ankle. Loss was estimated at \$4,500,000 to the structure and \$500,000 to the contents.

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### **Virginia**

**Dollar Loss:** \$5,000,000

**Month:** December

**Time:** 3:50 p.m.

### **Property Characteristics and Operating Status**

This two-story single-family home was of unprotected wood-frame construction. The ground floor area was not reported. The home was occupied at the time.

### **Fire Protection Systems**

There was a complete coverage system of smoke detection equipment in the home, on all levels and sleeping areas. There were no alarms in the area of origin (the garage). The alarms activated in the home. There was no suppression system present.

### **Fire Development**

As the homeowner worked on his car in an attached garage, the fuel tank, which he was removing, struck the vehicle's battery, creating a spark and fire. The fire spread throughout the entire garage as the owner attempted to extinguish the fire. The fire spread into and throughout the home.

### **Contributing Factors and Other Details**

Loss was estimated as \$2,000,000 to the home and \$3,000,000 to the contents.

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### **New Jersey**

**Dollar Loss:** \$5,000,000

**Month:** December

**Time:** 7:38 p.m.

### **Property Characteristics and Operating Status**

This three-story single-family home was of unprotected ordinary construction and covered 12,000 square feet. The house was set back 200 feet up a very steep winding driveway and surrounded by trees. At the time of the fire, the owners were away on vacation.

### **Fire Protection Systems**

There was a complete coverage smoke detection system present, on all levels and sleeping areas. Due to dead batteries in the alarms, they did not activate. There was no suppression system present.

### **Fire Development**

A furnace ignited nearby combustibles in a second-story storage closet. The fire spread vertically to the third-story then horizontally throughout the top floor and attic, to the roof.

### **Contributing Factors and Other Details**

There was a delay of 45 minutes to one hour due to the house being unoccupied at the time. Firefighters responded to a call for smoke in the area and investigated a short time before locating the fire. Fire investigators believe that the location and the trees hid the fire from sight. Stainless steel ceilings throughout the house made overhaul operations difficult. Damage to the structure was estimated at \$2,400,000 and \$2,600,000 to the contents.

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## MANUFACTURING

### Georgia

**Dollar Loss:** \$50,000,000

**Month:** May

**Time:** 4:25 a.m.

### Property Characteristics and Operating Status

This one-story chemical manufacturing plant was of protected ordinary construction and covered 400,000 square feet. The plant was in operation at the time.

### Fire Protection Systems

There was no automatic detection equipment present. There was a complete coverage wet-pipe sprinkler system present. The system activated but was overpowered by the spreading fire. The reason for this was not reported.

### Fire Development

A fire broke out when a chemical reaction occurred in the warehouse area of the plant. The chemicals involved were not identified.

### Contributing Factors and Other Details

Very heavy smoke covered the area, causing local officials to evacuate many downwind of the fire. Damage to the structure was estimated at \$20,000,000 and \$30,000,000 to the contents.

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### Ohio

**Dollar Loss:** \$15,000,000

**Month:** March

**Time:** 7:54 p.m.

### Property Characteristics and Operating Status

This 50-foot-high sawmill was of protected wood-frame construction. The ground floor area and operating status were not reported.

### Fire Protection Systems

There was no information reported on automatic detection equipment. There was no automatic suppression equipment.

### Fire Development

This suspicious fire broke out in bulk storage of wood product.

### Contributing Factors and Other Details

None reported.

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**Minnesota**

**Dollar Loss:** \$15,000,000

**Month:** December

**Time:** 6:13 p.m.

**Property Characteristics and Operating Status**

This two-story dairy product plant was of unprotected ordinary construction and covered 200,000 square feet. The plant was in full operation at the time of the fire.

**Fire Protection Systems**

There was a smoke detection system present. Its coverage and performance were not reported. There was a local coverage sprinkler system present. Its type, activation and performance were not reported.

**Fire Development**

A malfunction in a compressor in a second-story machine room caused an explosion and fire which extended to the warehouse section.

**Contributing Factors and Other Details**

Melted butter made for slippery footing at the fire scene. The loss was estimated at \$5,000,000 to the structure and \$10,000,000 to the contents.

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**California**

**Dollar Loss:** \$10,000,000

**Month:** July

**Time:** 1:22 p.m.

**Property Characteristics and Operating Status**

This 10-story manufacturing plant covered 30,000 square feet. The type of product manufactured there and the type of building construction were not reported. The plant was in full operation at the time the fire broke out.

**Fire Protection Systems**

There was a complete coverage smoke detection system present. The system operated and alerted the occupants. There was a complete coverage wet-pipe sprinkler system present. This system operated and contained the fire. The water flow alarm notified the fire department.

**Fire Development**

A heater in a basement manufacturing area ignited nearby plastic materials. No information was reported on the fire's spread.

**Contributing Factors and Other Details**

Damage was estimated at \$5,000,000 to the structure and \$5,000,000 to the contents. Much of the loss was in a laboratory in the basement.



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**Oregon**

**Dollar Loss:** \$8,501,000

**Month:** March

**Time:** 8:21 a.m.

**Property Characteristics and Operating Status**

This one-story petroleum recycling plant was of heavy-timber construction and covered 186,900 square feet. The plant was in full operation at the time.

**Fire Protection Systems**

No information was reported on any detection equipment. There was a complete coverage dry-pipe sprinkler system present. The system operated, but its rate of application was insufficient to control the fire.

**Fire Development**

A spark from an oxy/acetylene cutting torch fell into an open sludge-oil pit and ignited the contents instantaneously. The fire grew out of control quickly despite the activation of the sprinkler system. The fire spread through several businesses inside the building.

**Contributing Factors and Other Details**

Firefighters reported insufficient water pressure in hydrants originally. Two firefighters were injured. Damage to the structure was estimated at \$3,000,000 and \$5,501,000 to the contents.

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**Indiana**

**Dollar Loss:** \$5,000,000

**Month:** April

**Time:** 7:45 a.m.

**Property Characteristics and Operating Status**

This two-story foam products vinyl coating plant was of protected non-combustible construction and covered 20,000 square feet. The plant was in full operation at the time of the fire.

**Fire Protection Systems**

There was no automatic detection equipment present. There was a complete coverage wet pipe sprinkler system. The system did not operate due to damage to its supply line during an explosion.

**Fire Development**

A small explosion occurred in or around an automatic spray booth where vinyl was sprayed onto foam. The cause is still under investigation. A second and larger explosion occurred, blowing out walls and collapsing the roof. A fire broke out in two of the paint booths. The fire was contained to this area by the fire department.

### **Contributing Factors and Other Details**

Five civilians suffered various injuries related to the explosion and fire. Damage to the structure was estimated at \$1,500,000 and \$3,500,000 to the contents.

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#### **Pennsylvania**

**Dollar Loss:** \$5,000,000

**Month:** December

**Time:** 1:16 a.m.

#### **Property Characteristics and Operating Status**

This two- and three-story electroplating plant was of unprotected ordinary construction. The ground floor area was not reported. The plant was closed for the night when the fire broke out.

#### **Fire Protection Systems**

There was no automatic smoke detection equipment or suppression system present.

#### **Fire Development**

The only information reported was that this fire was unintentional in nature and started in the machine shop.

### **Contributing Factors and Other Details**

Three firefighters were injured.

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## **STORAGE**

#### **Tennessee**

**Dollar Loss:** \$100,000,000

**Month:** March

**Time:** 12:19 a.m.

#### **Property Characteristics and Operating Status**

This was an auto parts storage warehouse containing 244,000 square feet of rack storage. The height and type construction were not reported.

#### **Fire Protection Systems**

No information was reported on automatic detection. There was a sprinkler system present and operated, but there was no in-rack suppression equipment. The coverage and effectiveness of the sprinkler system was not reported.

#### **Fire Development**

An incendiary fire was set by a worker looking to get off from work for the night. The arsonist has been found guilty and is serving prison time.

### **Contributing Factors and Other Details**

Fire spread was rapid due to a petroleum based jelly coating on the auto parts in racks with no in-rack sprinkler system. A strong wind through the open doors helped fan the fire. Three firefighters were injured.

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### **Washington**

**Dollar Loss:** \$10,500,000

**Month:** January

**Time:** 11:11 a.m.

### **Property Characteristics and Operating Status**

No information reported this storage property.

### **Fire Protection Systems**

No information reported.

### **Fire Development**

No information reported.

### **Contributing Factors and Other Details**

No information reported.

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### **Minnesota**

**Dollar Loss:** \$10,250,000

**Month:** November

**Time:** 6:03 a.m.

### **Property Characteristics and Operating Status**

This 1 ½-story electronic equipment warehouse was of unprotected non-combustible construction and covered almost 10,000 square feet. The warehouse was closed for the weekend at the time of the fire.

### **Fire Protection Systems**

There was no automatic smoke detection system or suppression system present.

### **Fire Development**

A gas water heater in the mezzanine level above office space ignited paper records. The fire burned records and the office space. Fire officials estimated that the fire burned for up to hours unnoticed and created a tremendous amount of heat throughout the warehouse. A passerby discovered the fire and called 911.

### **Contributing Factors and Other Details**

The water heater was in poor operating condition and clearance was not maintained with the paper product. Loss was estimated at \$250,000 to the structure and \$10,000,000 to the contents which was electronic equipment.

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#### **Minnesota**

**Dollar Loss:** \$8,000,000

**Month:** July

**Time:** 5:50 a.m.

#### **Property Characteristics and Operating Status**

This was a 120,000-gallon slurry oil storage tank in a refinery. The refinery was operating at the time of the fire.

#### **Fire Protection Systems**

No automatic detection or suppression equipment present.

#### **Fire Development**

Lightning struck the top of this storage tank. The top of the tank lifted off and oil ignited. The fire melted part of the side of the tank and some product escaped.

### **Contributing Factors and Other Details**

None reported.

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#### **Minnesota**

**Dollar Loss:** \$5,000,000

**Month:** January

**Time:** 11:15 p.m.

#### **Property Characteristics and Operating Status**

This 14-foot-high fire station was of protected wood-frame construction and covered 2,400 square feet. A second building of 3,800 square feet belonging to the fire department was also damaged. Both buildings were unoccupied at the time.

#### **Fire Protection Systems**

There was no smoke detection or suppression equipment present.

#### **Fire Development**

A still undetermined source ignited an LP gas leak. The resulting explosion and fire destroyed the smaller of the two buildings and damaged the other. The fire department lost seven vehicles, all personal protection equipment as well as breathing apparatus and rescue equipment.

### **Contributing Factors and Other Details**

When firefighters arrived at the station they found their apparatus on fire and destroyed.

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#### **Ohio**

**Dollar Loss:** \$5,000,000

**Month:** August

**Time:** 6:37 p.m.

#### **Property Characteristics and Operating Status**

This three-story general-purpose warehouse was of heavy-timber construction and was used to store a variety of products. The ground floor area and operating status were not reported.

#### **Fire Protection Systems**

No information was reported on automatic smoke detection equipment. There was no suppression system.

#### **Fire Development**

No cause or origin has been determined.

### **Contributing Factors and Other Details**

None reported.

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## **VEHICLE**

#### **Colorado**

**Dollar Loss:** \$12,010,000

**Month:** November

**Time:** 10:00 a.m.

#### **Property Characteristics and Operating Status**

An 18-passenger corporate jet crashed on takeoff near the end of the runway and slid about 1,400 feet in a field. At the time there was light snow and mist. At the time of the crash and fire there were six passengers on board

#### **Fire Development**

A post impact fire ensued, destroying the aircraft. During the crash, aviation fuel was released and ignited, engulfing the aircraft.

### **Contributing Factors and Other Details**

Three people died in the crash of impact-related injuries, and three others survived. Loss to the aircraft was estimated at \$12,000,000 and \$10,000 to the contents.

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**Minnesota**

**Dollar Loss:** \$10,000,000

**Month:** April

**Time:** 7:14 p.m.

**Property Characteristics and Operating Status**

This fire involved a military aircraft on landing on an airport runway.

**Fire Development**

An Air National Guard C-130 aircraft reported an unsafe landing gear prior to landing. Just after landing and during roll out, the right wing tip, prop and engine all hit the ground. The landing gear collapsed and the engine burst into flames. Fire apparatus on scene due to the alert of a pending problem extinguished the fire in a short time.

**Contributing Factors and Other Details**

None reported.

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**Florida**

**Dollar Loss:** \$8,000,000

**Month:** April

**Time:** 6:39 p.m.

**Property Characteristics and Operating Status**

A 130-plus-foot yacht at a marina pier.

**Fire Development**

The cause and origin of this fire has not been determined. Upon arrival, firefighters reported light smoke showing from the yacht. During initial set up of hose lines, the fire on the yacht flashed over and firefighters went to a defensive attack.

**Contributing Factors and Other Details**

Four civilians -- two crew members and two good Samaritans who tried to extinguish the fire -- were injured.

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**STORAGE****Georgia**

**Dollar Loss:** \$11,000,000

**Month:** June

**Time:** 11:59 p.m.

**Property Characteristics and Operating Status**

This two-story sporting goods store was of unprotected noncombustible construction and covered 100,000 square feet. The store was closed at the time of the fire.

### **Fire Protection Systems**

There was an automatic smoke detection system present that operated. The coverage of the system was not reported. There was no suppression system present.

### **Fire Development**

A fire of undetermined cause broke out in the storage area of this store. Firefighters making an interior attack were faced with a flashover as the door to the fire area was opened. Firefighters withdrew to a defensive attack at that point.

### **Contributing Factors and Other Details**

During the fire, multiple rounds of ammunition discharged and several kegs of black powder exploded. The owner had made firefighters aware of these contents as well as a large amount of two-pound propane cylinders and camp fuel stored inside.

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## **STORE AND OFFICE**

### **Indiana**

**Dollar Loss:** \$5,000,000

**Month:** January

**Time:** 5:07 p.m.

### **Property Characteristics and Operating Status**

This three-story block of stores with apartments above was of unprotected ordinary construction and covered 40,000 square feet. The shops were open and operating at the time of the fire.

### **Fire Protection Systems**

There was a smoke detection system present. The coverage and effectiveness were not reported. There was no suppression system.

### **Fire Development**

A failure in electrical wiring near an overhead light in a void above a drop ceiling of the show room caused this fire. During the day, a worker in the store had smelled an unusual odor, but she was unable to locate the cause. Workers in a nearby store reported smelling wood burning a short time before another worker reported smoke from the roof of the nearby store. The fire spread in voids up to the attic and roof area.

### **Contributing Factors and Other Details**

None reported.

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### **California**

**Dollar Loss:** \$5,000,000

**Month:** January

**Time:** 2:00 a.m.

### **Property Characteristics and Operating Status**

This one-story office property was of unprotected wood-frame construction. The area covered was not reported. The building was closed for the night.

### **Fire Protection Systems**

There was no automatic detection or suppression system present.

### **Fire Development**

A fire broke out when two strip type circuit breakers (relocateable power taps) in tandem overheated and ignited carpeting in an office. The fire spread to the room and contents, then to the attic and throughout the structure.

### **Contributing Factors and Other Details**

None reported.

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## **OUTSIDE FIRE**

### **Connecticut**

**Dollar Loss:** \$11,200,000

**Month:** March

**Time:** 10:00 p.m.

### **Property Characteristics and Operating Status**

This incident involved a tanker truck carrying 12,000 gallons of fuel oil on an interstate highway

### **Fire Development**

The tanker truck collided with a car on an interstate. The ensuing fireball caused severe damage to the highway and an overpass. The fire burned out of control for several hours causing the elevated section of highway to buckle and sag.

### **Contributing Factors and Other Details**

One firefighter and one civilian suffered minor injuries.

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## **OUTSIDE PROPERTIES**

### **Utah**

**Dollar Loss:** \$10,000,000

**Month:** July

**Time:** 7:10 p.m.

### **Property Characteristics and Operating Status**

Outside storage area for rolled paper at a paper plant.

### **Fire Development**

This incendiary fire was set with available combustibles at the location. The area was fully involved in fire on arrival.



### **Contributing Factors and Other Details**

There was a sprinkler system in an exposed building that activated and assisted in keeping the fire from spreading into that structure.

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## **EDUCATIONAL**

### **California**

**Dollar Loss:** \$8,572,000

**Month:** February

**Time:** 12:00 p.m.

### **Property Characteristics and Operating Status**

This one-story middle school was of protected ordinary construction and covered 14,400 square feet. The school was not in session that day but a teacher was in the building preparing for classes.

### **Fire Protection Systems**

There was partial coverage of heat detection equipment present, though not in the area of fire origin. A detector activated shortly after the fire was discovered. There was no suppression system present.

### **Fire Development**

The exact source of ignition of this fire could not be determined. It broke out above the ceiling of a classroom in the science wing and burned undetected through the open combustible construction of the attic and mansard roof. The fire destroyed the science wing as well as parts of two other wings.

### **Contributing Factors and Other Details**

No fire stops or separations in mansard or overhangs, and no fire rated walls allowed the fire to spread. Loss to the school was listed as \$8,072,000 and \$500,000 to the contents.

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### **Illinois**

**Dollar Loss:** \$5,000,000

**Month:** February

**Time:** 10:22 a.m.

### **Property Characteristics and Operating Status**

This one-story elementary school was of unprotected ordinary construction. The ground floor area was not reported. The school was in session at the time of the fire with 375 kindergarten through fifth-grade students and 40 faculty members present.

### **Fire Protection Systems**

There was a combination system of smoke detection equipment present. There were also manual pull stations. It was not reported if these systems were activated. There was no suppression system present.

## **Fire Development**

A ceramic heat gun used by a custodian to thaw ice jams ignited combustible roof construction. The fire spread horizontally and vertically into the roof truss area. The open construction with no fire stopping allowed the fire to spread rapidly and undetected by occupants and the automatic detection system.

## **Contributing Factors and Other Details**

Fire officials reported a positive aspect of this fire in that the outcome of this fire could have been tragic if it were not for the quick evacuation and accountability of the students and faculty members. Firefighters arrived within four minutes to find that everyone had exited the structure in 20-degree weather with no coats and evacuated to a nearby structure where head counts were taken.

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## **BASIC INDUSTRY**

### **Hawaii**

**Dollar Loss:** \$10,750,000

**Month:** January

**Time:** not reported

### **Property Characteristics and Operating Status:**

Electric power plant. No other information was reported.

### **Fire Protection Systems:**

No information reported.

### **Fire Development:**

No information reported.

### **Contributing Factors and Other Details:**

No information reported.

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## **PUBLIC ASSEMBLY**

### **Arizona**

**Dollar Loss:** \$8,000,000

**Month:** December

**Time:** 7:33 p.m.

### **Property Characteristics and Operating Status**

This two-story convention center was of protected non-combustible construction. The ground floor area was not reported. The center was fully operating at the time of the fire.

### **Fire Protection Systems**

There was a smoke detection system present that operated and alerted the occupants. The coverage was not reported. There was a wet-pipe sprinkler system present. The system did activate with over 30 heads flowing water.

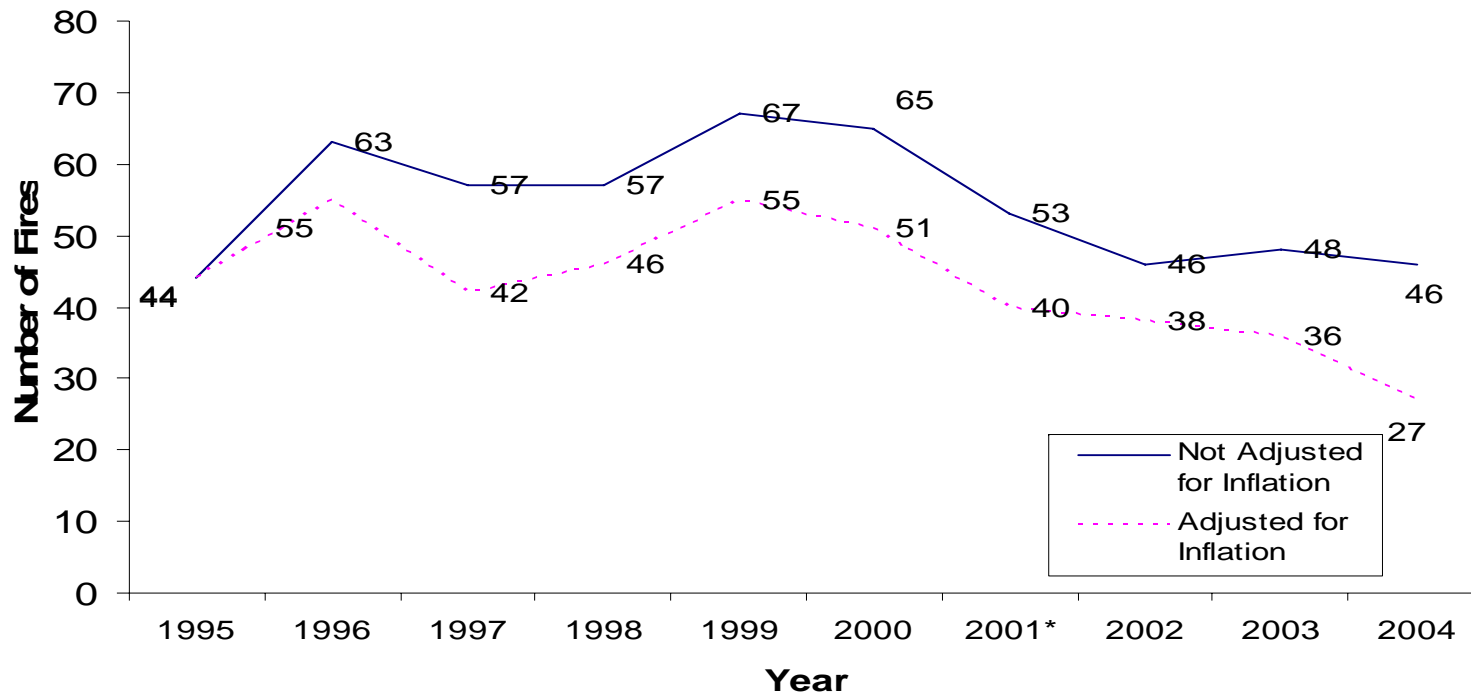
**Fire Development**

Heat from a halogen light ignited walnut dust used in filming a collapse scene in a mine for a movie. The fire ignited polyurethane beams and walls of a cave and extended to the cave roof. A covering over the movie set prevented water from the sprinkler from reaching the seat of the fire but the sprinkler flow did prevent the fire's spread beyond the set.

**Contributing Factors and Other Details**

Original reports were that one worker was missing. A primary search was initiated but the worker was located unharmed. Visibility was zero as firefighters attempted an initial fire attack. Firefighters were warned initially of loose rattlesnakes at the movie set. The snakes were corralled by an animal handler and posed no threat to the firefighters and harmed no one.

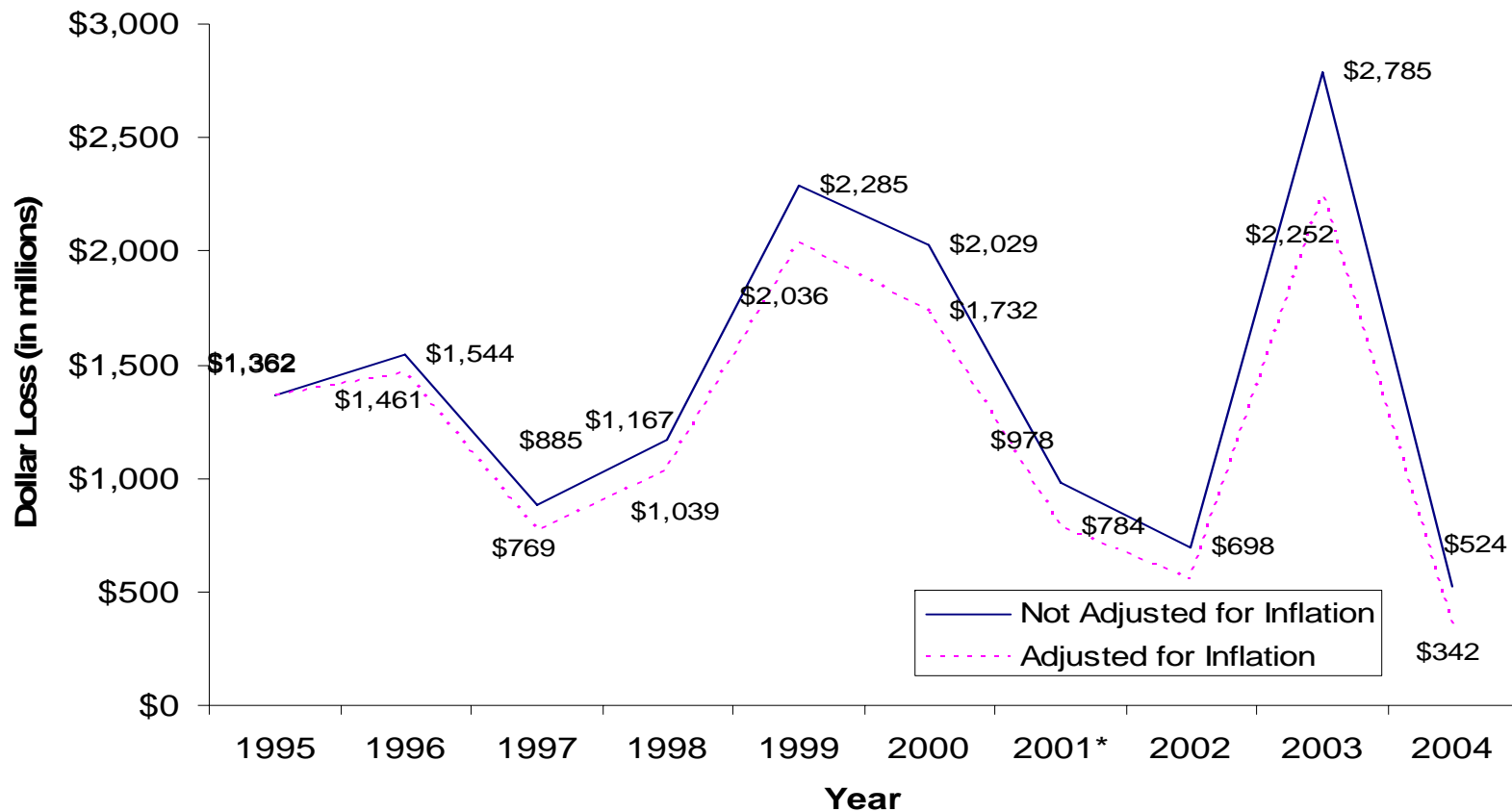
**Figure 1**  
**Large-Loss Fires, Unadjusted and Adjusted for Inflation**  
**(1995 - 2004)**



Note: The 53 and 40 fires in 2001 *include* the 9/11/01 World Trade Center Incident

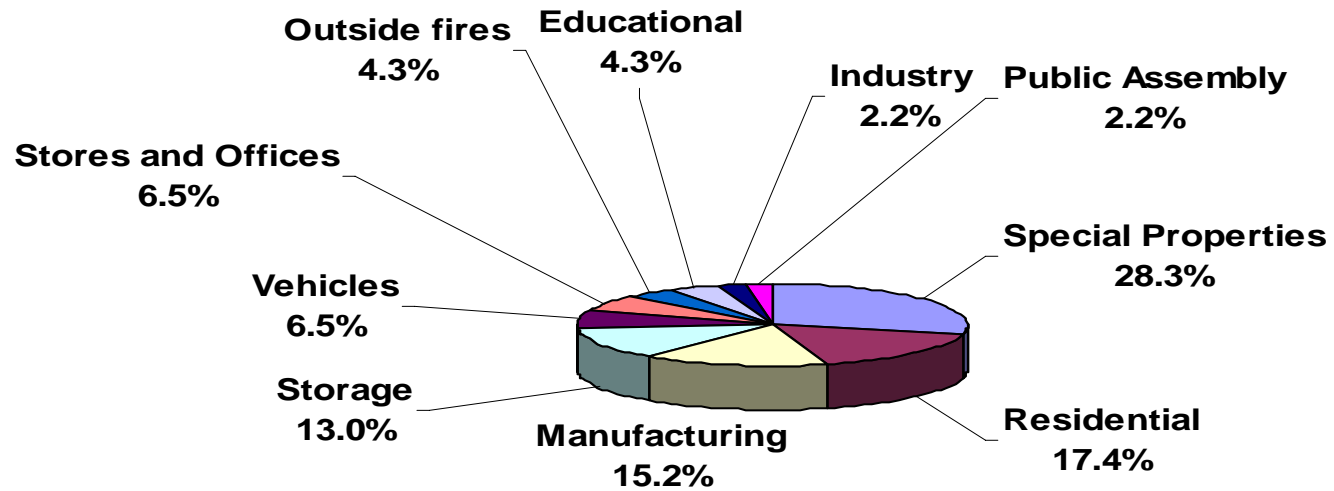
Source: NFPA's Fire Incident Data Organization (FIDO)

**Figure 2**  
**Direct Dollar Loss in Large-Loss Fires, Unadjusted and**  
**Adjusted (1995-2004)**



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

**Figure 3**  
**Large-Loss Fires by Major Property Use**



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