

LARGE-LOSS FIRES IN THE UNITED STATES – 2006

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Acknowledgments

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The Large-Loss Fire Study is Seventy-Five Years Old this Year

“The total estimated fire loss in the United States for the year 1931 is \$453,500,000. This amount is based on figures compiled by the National Board of Fire Underwriters for the eleven months ended November 30, 1931, with an estimate for December based upon loss experiences for the same month in previous years adjusted for the trend of losses of the current year.”

“During the year 1931 there were 43 fires involving a loss of \$250,000 or more...”

Source: The *Quarterly* of the National Fire Protection Association.

The loss for those fires was estimated to be \$25,388,000. The largest loss in a single fire in 1931 was \$5,000,000 at an Armory in New York State. Three other fires resulted in over \$1 million in losses.

The large-loss study has gone through several changes in the 75 years. In the past, fires were reported to be in Canada, Alaska (before it was a state), and Newfoundland. Business losses were included in several studies. The study now identifies the fires from the United States, only. Other changes are redefined property classifications, and the study does not include economic (business) losses. The study first appeared in the *Quarterly* magazine, then went to the *Fire Journal*. Most important, over the years the threshold that defines large-loss fires has changed several times.

- For the 1931 study the loss had to be over \$250,000,
- For the 1978 study the loss had to be over \$500,000,
- For the 1980 study the loss had to be over \$1,000,000,
- For the 1987 study the loss threshold was raised to where it is today, \$5,000,000.

In 2006, there were an estimated 1,642,500 fires with a total estimated loss of \$11.3 billion in the United States. In large-loss fires, the total fire loss was \$551 million.

Factors noted in the current large-loss study that contributed to a fire becoming a large-loss are very much the same as 75 years ago.

- Heavy fire loads, and poor housekeeping,
- Open construction,
- No detection equipment,
- Lack of working sprinkler systems,
- Delay in alarms as employees fought the fire first.

What will the next 75 years bring? Are we reducing the number of large-loss fires and the severity of the costliest fires? Can we reduce them more? The long-term trend in total fire loss, at least relative to population or the size of the economy, has been significantly down for more than the past 75 years. However, the last 25 years have seen several of the costliest fires of all time, particularly wildland/urban interface fires. Is it realistic to imagine that we will find the way and the will to eliminate large-loss fires – by 2032, 2057, or 2082? One thing is certain; the NFPA team will never stop trying.

In 2006, fire departments in the United States responded to an estimated 1,642,500 fires, which an estimated loss of \$11.3 billion.¹ Many of these fires were small, with little or no property damage reported; however, 45 resulted in losses of \$5 million or more each.²

Collectively, these large-loss fires resulted in \$551 million in direct property loss, and were responsible for the deaths of six firefighters and 11 civilians, as well as injuries to 35 firefighters and 13 civilians. Despite the fact that these fires accounted for just .003 percent of the total fires estimated to have occurred in 2006, they accounted for 4.9 percent of the total estimated dollar loss.

Each year, NFPA reports on large fires and explosion losses in the United States, defined as events resulting in property damage (to structure and contents) of at least \$5 million. In 2006, there was an increase of six fires from 2005, and an increase of \$201 million, or 57.4 percent, in property losses from the \$350 million in 2005. It should be stated that the 2005 total was the lowest since 1987, when the \$5 million threshold was set.

Before adjusting for inflation, the number of large-loss fires in 2006 was the second lowest since 1997 (see Table 1, Figure 1 and Figure 2).³ When adjusted for inflation to 1997 dollars, the number of fires that occurred in 2006 that could be categorized as large-loss (i.e. loss of \$5 million in 1997 dollars) drops to 28, with a total adjusted loss of \$367 million. This is also the second lowest number of large-loss fires since 1997. The adjusted loss is the second lowest in the 10-year period and 66 percent below the 10-year average adjusted loss total.

Costliest fires in 2006

In mid-March, the Texas Panhandle was experiencing extreme fire danger and was experiencing a drought. Factors for fire included no rain for five months, low fuel moisture, low humidity, and winds of more than 60 miles (96 kilometers) per hour. Several fires broke out on a Sunday afternoon, when the winds caused electrical wires to touch and short out or the wind brought the

¹ . "Fire Loss in the Unites States during 2006," Michael Karter Jr., *NFPA Journal*, September/October 2007.

² The 45 large-loss fires of 2006 are those for which losses are reported and verified.

³ The numbers of fires and dollar loss may not show as the numbers in the year originally reported due to late-arriving information.

wires in contact with ground cover. These fires were known as the East Amarillo Complex and caused an estimated loss of \$95 million.

During this outbreak of fires, the smoke reduced visibility on an interstate. One car slowed or stopped in the smoke, causing a chain reaction crash that involved nine vehicles. There were four fatalities in two of the cars. After this crash, a 90-mile (144-kilometer) stretch of the interstate was closed for nine hours due to the smoke conditions.

Within an approximately 45-mile (72-kilometer) radius, four other incidents took the lives of eight people, including one firefighter.

The firefighter died when the apparatus he was operating overturned and went down a ravine. Two other firefighters were injured in this crash. The firefighters were fighting one of the larger fires in the complex.

Then a car with four occupants went off the roadway due to the blinding smoke conditions. When the vehicle became disabled, the four attempted to flee but the fire overtook them. The fires also overran two structures in which three occupants were preparing to evacuate.

At times, the winds spread these fires at a rate of 5 miles (8 kilometers) per hour and the fire burned everything in its path.

When the fires were extinguished seven days later, the death toll was at 12 and much of the property was destroyed. At least 89 buildings were burned, including nine homes and 80 outbuildings. Also destroyed were 1,040 electric poles, 2,000 miles (3,218 kilometers) of fence, and windmills used for water supply. Also, 4,296 head of cattle were lost.

This wildland fire complex was just one of the 15 fires that caused losses of \$10 million or more in property damage last year (see Table 2). Of the 15 fires, 11 were in structures, three were wildland fires, and one involved a vehicle. Collectively, these 15 fires caused a loss of \$360 million or 65.3 percent of the total losses in large-loss fires and 3.2 percent of the total fire losses in 2006.

The number of large-loss fires and explosions and the losses in these fires fluctuate widely, and show no consistent trend from year to year. The large-loss study only reports on those fires with a confirmed estimated loss.

Where the fires occurred

In 2006, large-loss fires occurred in major property categories except health care and correctional facilities (see Table 3 and Figure 3).

Thirty-eight of the large-loss fires occurred in structures, resulting in combined losses of \$396 million. Ten fires occurred in manufacturing properties, resulting in losses of \$113 million. Six fires each occurred in storage properties and stores, resulting in losses of \$61 million and \$51 million, respectively. Five fires occurred in residential properties (two in single-family homes and three in apartment buildings) with resulting losses of \$44 million.

Four fires occurred in special properties, resulting in losses of \$30 million. All of the special properties were structures under construction.

There were three fires each in education properties and public assembly properties, resulting in losses of \$51 million and \$21 million respectively. One fire in an educational property spread to 59 other structures. And lastly there was one fire in an industrial property that resulted in a loss of \$25 million.

There were also four large-loss fires in wildlands, totaling \$125 million in property losses, and three in vehicles (an airplane, a yacht, and a truck), with a total loss of \$30 million.

Operating status was reported for 31 of the 38 structure fires. Twenty-two of the properties were at full operation at the time of the fire, one was partially operating, one had workers on the scene, but not in the tunnel where the fire occurred, and seven were closed with no one on the property. The status of operations at the other seven structures was unknown or not reported.

The fire cause was reported for 19 of the structure fires, all four of the wildland fires and two of the vehicle fires. Seven of the structure fires and one of the wildland fires were intentionally set, with a total loss of \$125 million, or 22.7 percent of the total fire losses in large-loss fires, and were responsible for the deaths of five firefighters.

Sixteen of the fires broke out between the hours of 11 p.m. and 7 a.m. Four of these were known to be intentionally set, two were the result of mechanical failures, two resulted from short circuits, and one involved an unattended candle. The cause was unknown for the other seven fires.

Detection and suppression systems

Information on detection equipment was reported for 24 of the 38 structure fires. Fourteen occurred in properties that had no automatic detection equipment present. Some form of detection equipment was present in 10 properties. Five of the 10 properties had smoke detection equipment while three had combination smoke and heat detection. The type of system in the other two structures was not reported. This means that only 42 percent of the properties with automatic detection equipment reported had some sort of automatic protection. The coverage of the system was reported in seven of the 10 properties. Five properties had complete coverage. Two were smoke detectors, two were combination heat and smoke detection and the type of the last one was not reported. Two had partial or local coverage smoke detection present.

The operation of these systems was reported in eight fires. In seven of the fires, the systems operated or were sounding when the fire department arrived. One of these tripped the fire department master box on the building. One system did not operate because it was out of service for an unreported reason before the fire. The operation of the other two systems was unknown or not reported.

Information on automatic suppression equipment was reported for 29 of the 38 structure fires. Of these 29 structures, 10 (34 percent), were equipped with some sort of suppression equipment. Nineteen properties, (66 percent), were not equipped with suppression equipment. Four of the 10 protected properties had complete coverage systems. Three of these were protected by wet-pipe sprinkler systems and one by a dry-pipe system. Two structures had partial coverage wet-pipe sprinkler systems. The coverage of four systems was unknown or not reported. These included two wet-pipe and two unknown type sprinkler systems.

Suppression equipment operated in seven of the 10 protected properties. Two systems extinguished the fire; one system controlled the fire. Three systems operated, but two of the three were overpowered by fires that spread from unprotected areas or from outside; and the third

operated but was ineffective for an unreported reason. One system partially operated; the system in the area of origin had been damaged by a collapse during a hurricane, the riser was shut down and branch lines capped, but a system in another area of the building did activate. Two systems failed to operate -- one had been shut down prior to the fire and the other had a fire pump motor that failed to operate. No information was reported on the other system.

Of the 38 structure fires, 24 had information reported on both detection and suppression equipment. Seven properties, or 29 percent, had no automatic protection at all. Nine had just detection equipment, seven had just suppression equipment, and one had both detection and suppression equipment.

What we can learn

In 2006, the number of large-loss fires increased by six, or 15 percent, and the property loss rose by \$201 million, or 57 percent. In seven of the past 10 years, from 1997 to 2006, there has been at least one fire with a loss of more than \$100 million. NFPA has no record of any confirmed loss of that size in 2006.

Each year the large-loss fire study reports on the proportion of fires accounting for major losses that occurred in properties with and without protection by automatic detection or suppression equipment, partial protection or system rendered ineffective by action or omissions made before fire began. Explosions or structural collapses also sometimes damage systems to the point of being inoperative or ineffective. Table 4 identifies these.

Adherence 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.

There were a range of ignition causes and factors reported among the large-loss fires in 2006, including incendiary, abandoned or discarded smoking materials, mechanical or part failures, short circuits, combustibles too close to heat, and an unattended candle. Proper design, maintenance, and operation of fire protection systems and features can keep a fire from becoming a large-loss fire. Proper construction, storage methods, and housecleaning will make fires less likely and help control or limit the fire spread, if fire occurs.

Where We Get Our Data

The 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 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. Once an incident has been identified, we request information on the fire from the fire department or the agency having jurisdiction. We also contact federal agencies that have participated in investigations, the state fire marshal's offices, and military sources.

The diversity and redundancy of these data sources enables the NFPA to collect the most complete data available on large-loss fires.

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.

Table 1
Large-Loss Fires that Caused \$5 million or More in Property Damage, 1997-2006

Year	Number of Fires	Number of Fires Causing \$5 million or More in 1997 Dollars	Property Loss (unadjusted) (in millions)	Property Loss 1997 Dollars (in millions)
1997	57	57	\$885	\$885
1998	57	48	\$1,167	\$1,105
1999	67	55	\$2,285	\$2,144
2000	65	53	\$2,029	\$1,835
2001*	52	39	\$978	\$826
2002	46	39	\$698	\$591
2003	49	42	\$2,811	\$2,420
2004	46	31	\$524	\$380
2005	39	21	\$350	\$210
2006	45	28	\$551	\$367

* 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 1997 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 2006

Incident and Location	Loss in Millions
Brush fire complex, Texas	\$95.2
Conflagration, Alaska	\$35.0
Plastics products plant, Pennsylvania	\$34.0
Warehouse, Pennsylvania	\$26.0
Power plant, Virginia	\$25.0
Passenger jet aircraft, California	\$20.0
Food processing plant, Alabama	\$20.0
Senior living apartment, Pennsylvania	\$20.0
Dormitory under construction, Washington	\$13.0
Department store - 1, Arizona	\$13.0
Department store - 2, Arizona	\$13.0
Wildland fire, California	\$12.9
Wildland fire, California	\$11.7
Food processing plant, Illinois	\$11.0
Fast food restaurant, Louisiana	\$10.0
Total: 15 Fires	\$359.8

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

Table 3
2006 Large-Loss Fires by Major Property Use Classification

Property Use	Number of Fires	Percent of Fires	Total Dollar Loss (in millions)	Percent of Loss
Manufacturing	10	22%	\$113	20.5%
Storage	6	13%	\$61	11.1%
Stores and Offices	6	13%	\$51	9.3%
Residential	5	11%	\$44	8.0%
Wildland	4	9%	\$125	22.6%
Special Properties	4	9%	\$30	5.4%
Educational	3	7%	\$51	9.3%
Vehicle	3	7%	\$30	5.4%
Public Assembly	3	7%	\$21	3.8%
Industrial	1	2%	\$25	4.5%
Totals	45	100%	\$551	100.0%

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

Table 4
Large-Loss Incidents of 2006

MANUFACTURING PROPERTIES

Type Occupancy: Manufacturing Properties

State: Pennsylvania

Dollar Loss: \$34,000,000

Month: October

Time: 9:00 A.M.

Property Characteristics and Operating Status:

This one-story plastics products manufacturing plant covered 1,821,600 square feet (1,692,321 square meters) and was of unprotected noncombustible construction. The plant was operating at the time of the fire.

Fire Protection Systems:

There was no detection equipment present. There was a sprinkler system present. The type and coverage was not reported. The system had been disconnected by a previous occupant, and not in service. Several handheld 10-pound dry chemical extinguishers were used by workers in an attempt to fight this fire.

Fire Development:

A fire of undetermined origin broke out in cardboard boxed plastic products in the warehouse section of this plant. The fire spread rapidly throughout the contents.

Contributing Factors and Other Details:

A combination of a heavy fuel-load available, no detectors, and an inoperative sprinkler system contributed to the size and intensity of the fire. The wind helped spread the fire and the size of the facility taxed fire fighting resources. Four firefighters were injured. The loss was estimated at \$2,000,000 to the structure and \$32,000,000 to the contents.

Type Occupancy: Manufacturing Properties

State: Alabama

Dollar Loss: \$20,000,000

Month: September

Time: 4:51 P.M.

Property Characteristics and Operating Status:

This was a food preparation plant. No information was reported on the height, size, or type of construction of this building or its operating status.

Fire Protection Systems:

No information reported.

Fire Development:

No information reported

Contributing Factors and Other Details:

A roof collapse forced firefighters out of the building to a defensive attack.

Type Occupancy: Manufacturing Properties

State: Illinois

Dollar Loss: \$11,000,000

Month: August

Time: 12:47 PM

Property Characteristics and Operating Status:

This one-story pet food manufacturing plant covered 48,000 square feet (4,459 square meters) and was of unprotected wood-frame construction. The plant was closed for the weekend when the fire broke out.

Fire Protection Systems:

There was no detection or automatic suppression equipment present.

Fire Development:

A fire of unknown cause broke out in the warehouse section of this plant.

Contributing Factors and Other Details:

Four firefighters were injured fighting this fire. The loss was estimated at \$9,000,000 to the structure and \$2,000,000 to the contents.

Type Occupancy: Manufacturing Properties

State: Washington

Dollar Loss: \$9,000,000

Month: June

Time: 5:38 PM

Property Characteristics and Operating Status:

This three-story sawmill at a plywood plant covered 60,000 square feet (5,574 square meters) and was of heavy-timber construction. There were five other structures involved in this fire. The plant was in operation at the time of the fire.

Fire Protection Systems:

There was no detection equipment present. There were several complete coverage dry-pipe sprinkler systems present. The systems were located in several of the structures and did operate but were overpowered by the rapid spread of the fire and an overtaxed water system. A fire pump on the property did not operate properly to supplement the water supply for an unreported reason.

Fire Development:

A fire of undetermined origin began in a pile of saw dust and wood chips approximately 100 feet (30 meters) from the saw mill. Employees attempted to fight the fire before it got out of hand. A wind pushed the fire into the saw mill and other structures along the sawdust and wood chips on the ground.

Contributing Factors and Other Details:

It is the policy at this plant to fight a fire before calling the fire department. Employees attempted to extinguish the fire but it got out of hand, resulting in a delayed alarm. The wind and the sawdust and wood chips on the ground spread the fire into the sawmill and other structures. Seven employees were treated for smoke inhalation.

Type Occupancy: Manufacturing Properties

State: South Carolina

Dollar Loss: \$8,153,000

Month: October

Time: 7:15 P.M.

Property Characteristics and Operating Status:

This 12-foot (3.6-meter) hardwood flooring manufacturing plant covered 65,394 square feet (6,075 square meters) and was of unprotected wood-frame construction. The plant was operating at the time of the fire.

Fire Protection Systems:

There was no automatic detection or suppression equipment present.

Fire Development:

This incendiary fire was set by someone who used a lighter to ignite sawdust in the stockroom area. The fire spread upward and across the structure due to excessive sawdust and debris. The fire also spread rapidly through the adjoining area due to the large amount of raw flooring materials and wood stain products.

Contributing Factors and Other Details:

Housekeeping was an issue as sawdust and debris were allowed to build up. One firefighter was injured fighting the fire.

Type Occupancy: Manufacturing Properties

State: Virginia

Dollar Loss: \$7,000,000

Month: July

Time: 1:15 A.M.

Property Characteristics and Operating Status:

This two-story snack-food manufacturing plant covered 604,800 square feet (56,187 square meters) and was of unprotected ordinary construction. The plant was operating at the time of the fire.

Fire Protection Systems:

There was partial coverage smoke detection equipment above the commercial ovens. This system activated and alerted an alarm company, which contacted the fire department. There was a complete coverage wet-pipe sprinkler system present. The system operated and controlled the spread of the fire.

Fire Development:

During the preparation of snack crackers, vegetable oil is sprayed on the crackers on a conveyor belt. When a power outage occurred, the crackers that were under the heating elements ignited. The fire then spread to a supply drum of vegetable oil.

Contributing Factors and Other Details:

None reported.

Type Occupancy: Manufacturing Properties

State: Texas

Dollar Loss: \$7,000,000

Month: December

Time: 2:59 P.M.

Property Characteristics and Operating Status:

This two-story modular home manufacturing plant covered 86,000 square feet (7,989 square meters) and was of unprotected noncombustible construction. The plant was in operation at the time of the fire.

Fire Protection Systems:

No information reported on detection equipment. There was a wet pipe sprinkler system present of an unreported coverage and 10 heads operated. The system was ineffective for an unreported reason.

Fire Development:

The cause and origin were undetermined.

Contributing Factors and Other Details:

The loss was estimated at \$4,000,000 to the structure and \$3,000,000 to the contents.

Type Occupancy: Manufacturing Properties

State: California

Dollar Loss: \$6,500,000

Month: December

Time: 8 AM

Property Characteristics and Operating Status:

Crude oil unit in a refinery. No other information reported.

Fire Protection Systems:

No information reported.

Fire Development:

No information reported.

Contributing Factors and Other Details:

None reported.

Type Occupancy: Manufacturing Properties

State: Texas

Dollar Loss: \$5,500,000

Month: February

Time: 1:16 A.M.

Property Characteristics and Operating Status:

This one-story leather product tanning business covered 89,200 square feet (8,286 square meters) and was operating at the time of the fire. The type of construction was not reported.

Fire Protection Systems:

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

Fire Development:

The cause and origin is under investigation.

Contributing Factors and Other Details:

The loss was estimated at \$1,500,000 to the structure and \$4,000,000 to the contents.

Type Occupancy: Manufacturing Properties

State: Texas

Dollar Loss: \$5,000,000

Month: July

Time: 6:18 AM

Property Characteristics and Operating Status:

This two-story sporting goods manufacturing plant covered 51,000 square feet (4,738 square meters) and was of unprotected ordinary construction. The plant was closed at the time of the fire.

Fire Protection Systems:

There was no automatic detection equipment present. There was a partial coverage wet-pipe sprinkler system. The system operated, with 20 heads flowing, but it was ineffective because the system was not in the area of ignition and was overpowered by the spreading fire.

Fire Development:

Only information reported is that it was caused by short-circuit of a motor in a portable heating unit.

Contributing Factors and Other Details:

Firefighters made an aggressive interior attack without success. Loss was estimated at \$2,500,000 to the building and \$2,500,000 to contents.

STORAGE PROPERTIES

Type Occupancy: Storage Properties

State: Pennsylvania

Dollar Loss: \$26,000,000

Month: June

Time: 10: 45 PM

Property Characteristics and Operating Status:

This irregularly-shaped warehouse was used for bulk storage of shrink-wrapped paper products for mailing. It was one to three stories in height, covered 251,798 square feet (23,392 square meters) and was of unprotected ordinary construction. At the time of the fire, the warehouse was closed for the night.

Fire Protection Systems:

There was no detection or automatic suppression equipment present.

Fire Development:

This incendiary fire was set in multiple locations, and spread rapidly throughout the structure, which contained a large amount of bulk storage of paper products. The fire resulted in an extensive collapse of the warehouse.

Contributing Factors and Other Details:

One arrest has been made in this case. The loss was estimated at \$1,000,000 to the structure and \$25,000,000 to the contents.

Type Occupancy: Storage Properties

State: Florida

Dollar Loss: \$9,600,000

Month: March

Time: 8:04 PM

Property Characteristics and Operating Status:

The one-story industrial warehouse covered 100,000 square feet (9,290 square meters) and was of unprotected noncombustible construction. The warehouse was in full operation at the time of the fire.

Fire Protection Systems:

There was no detection equipment present. There was a partial coverage wet-pipe sprinkler system with two risers. One riser in the area of ignition had been shut down due to damage from collapse during a hurricane, and the branch lines had been capped. Part of the system away from the fire operated.

Fire Development:

This fire originated as an electrical short in wiring on a wood beam near the ceiling. The fire burned through the ceiling and roof, and throughout the warehouse. First-arriving firefighters found the structure fully engulfed in fire and attacked the blaze with master stream equipment.

Contributing Factors and Other Details:

One firefighter was injured fighting this fire. The loss was estimated at \$4,600,000 to the structure and \$5,000,000 to the contents.

Type Occupancy: Storage Properties

State: Tennessee

Dollar Loss: \$7,102,700

Month: November

Time: 7 PM

Property Characteristics and Operating Status:

This two-story plastics products warehouse was of unprotected non-combustible construction. The ground floor area was not reported. The warehouse was operating at the time the fire broke out.

Fire Protection Systems:

There was no detection equipment present. There was a wet-pipe sprinkler system present. Its coverage was not reported. The system failed to operate because its diesel pump motor locked up.

Fire Development:

A worker on a forklift saw sparks coming from a light fixture as he entered the area. The sparks fell on cardboard and plastic materials. The fire then spread throughout the structure.

Contributing Factors and Other Details:

None reported.

Type Occupancy: Storage Properties

State: Washington

Dollar Loss: \$7,000,000

Month: July

Time: 1:22 AM

Property Characteristics and Operating Status:

This pier was of heavy timber construction. No one was present at the time the fire broke out. No other information was reported.

Fire Protection Systems:

No detection or suppression equipment was present.

Fire Development:

The cause of this fire is undetermined. Upon arrival, firefighters found 75 feet (23 meters) to 100 feet (30 meters) of the pier on fire. The fire was also impinging on a 250-foot (76 meter) ship tied up to the pier. The fire traveled down the pier, forcing firefighters to withdraw and fight the fire from the mainland as a fireboat and a police boat fought the fire from the water side. The fire then spread to several small structures and to vehicles on the pier, as well as a second vessel.

Contributing Factors and Other Details:

Fire traveled several hundred feet underneath the pier, forcing firefighters to withdraw off the pier.

Type Occupancy: Storage Properties

State: Washington

Dollar Loss: \$6,450,000

Month: October

Time: 11:55 AM

Property Characteristics and Operating Status:

The one-story hops warehouse covered 60,000 square feet (5,574 square meters) and was of unprotected noncombustible construction. The warehouse was in full operation at the time of the fire.

Fire Protection Systems:

There was detection equipment present. The type and coverage were not reported. The system operated but failed to alert the occupants; the reason for this was not given. There was no automatic suppression equipment present.

Fire Development:

The cause and origin are undetermined.

Contributing Factors and Other Details:

The loss was estimated at \$450,000 to the structure and \$6,000,000 to the contents.

Type Occupancy: Storage Properties

State: California

Dollar Loss: \$5,000,000

Month: December

Time: 2 AM

Property Characteristics and Operating Status:

This one-story warehouse was being used for storing and shipping magazines and films. Some filming was being done in the facility as well. The structure covered 14,500 square feet (1,347 square meters) and was of protected noncombustible tilt-up construction. It was partially operating.

Fire Protection Systems:

There was no detection or suppression equipment present.

Fire Development:

The cause and origin of this fire is still under investigation.

Contributing Factors and Other Details:

Numerous fire and life safety issues were found in a post inspection of the building, including high-piled rack storage of up to 20 feet (6 meters) with no in-rack sprinklers; LPG tanks out in the open; multiple extension cords; and dead bolts on exit doors in the office area. Because filming was going on in the building, there should have been a change of occupancy classification. Two firefighters were injured at this fire. The loss was estimated at \$3,000,000 to the structure and \$2,000,000 to the contents.

STORES AND OFFICE PROPERTIES

Type Occupancy: Stores and Office Properties

State: Arizona

Dollar Loss: \$13,000,000

Month: June

Time: 10 PM

Property Characteristics and Operating Status:

This one-story department/food (super) store was of protected noncombustible construction and covered 208,437 square feet (19,364 square meters). The store was open with customers inside.

Fire Protection Systems:

There was no detection equipment present. There was a complete coverage wet-pipe sprinkler system. The system operated and extinguished the fire.

Fire Development:

This incendiary fire was set on the sales floor in the silk flower area with a lighter, just below a sprinkler head, which operated rapidly.

Contributing Factors and Other Details:

Two men have been arrested in this case. This was the first of two fires set in the same chain of stores in the same city. The loss was estimated at \$1,000 to the structure and \$12,999,000 to the contents. The store replaced most its inventory due to smoke and water damage.

Type Occupancy: Stores and Office Properties

State: Arizona

Dollar Loss: \$13,000,000

Month: June

Time: 10:45 PM

Property Characteristics and Operating Status:

This fire occurred 45 minutes later in an identical one-story department/food (super) store of protected noncombustible construction that covered 208,437 square feet (19,364 square meters). The store was open with customers inside.

Fire Protection Systems:

There was no detection equipment present. There was a complete coverage wet pipe sprinkler system. The system operated and extinguished the fire.

Fire Development:

As in the earlier fire, silk flowers on the sales floor were ignited with a lighter. This fire was also set just below a sprinkler head, which operated rapidly.

Contributing Factors and Other Details:

Two men have been arrested in this case. This was the second of two fires set in the same chain of stores in the same city. The loss was estimated at \$1,000 to the structure and \$12,999,000 to the contents. As in the first fire, the store replaced most of its inventory due to smoke and water damage.

Type Occupancy: Stores and Office Properties

State: California

Dollar Loss: \$7,900,000

Month: July

Time: 10:58 AM

Property Characteristics and Operating Status:

This one-story department store covered 30,000 square feet (2,787 square meters) and was of protected noncombustible construction. The store was open with 10 employees and 75 customers within.

Fire Protection Systems:

There was a combination of heat and smoke detectors present. The coverage was not reported but the system was out of service for an unreported reason when the fire broke out. There was no automatic suppression equipment present. Eight hand-held extinguishers were used by employees of the store and of a contractor who was present. None of these were effective due to the fire load and advancement of the fire.

Fire Development:

Welders were installing a steel threshold on the outside of the loading dock. The roll-up door was closed but sparks entered the building through gaps in the door frame. The sparks ignited a large stack of flattened cardboard. From there, the fire spread to the mezzanine and throughout the store.

Contributing Factors and Other Details:

An interior fire attack lasting 28 minutes was unsuccessful because there was only one stairwell to the mezzanine and it was involved with fire. As conditions deteriorated in the interior and on the roof, firefighters withdrew for an exterior attack. The loss was estimated at \$1,000,000 to the structure and \$6,900,000 to the contents.

Type Occupancy: Stores and Office Properties

State: Pennsylvania

Dollar Loss: \$7,000,000

Month: October

Time: 5:10 AM

Property Characteristics and Operating Status:

This two-story general store covered 170,000 square feet (15,793 square meters). No other information was reported.

Fire Protection Systems:

No information reported.

Fire Development:

No information reported.

Contributing Factors and Other Details:

None reported.

Type Occupancy: Stores and Office Properties

State: Oregon

Dollar Loss: \$5,472,000

Month: August

Time: 7:53 AM

Property Characteristics and Operating Status:

This three-story furniture store covered 11,520 square feet (1,070 square meters), and was of protected noncombustible construction. The store had not yet opened, but employees were just arriving to open up for the day.

Fire Protection Systems:

There was a partial coverage system of smoke detection equipment on each floor connected to a security system. The detectors activated and notified the alarm monitoring company. There was no automatic suppression equipment present.

Fire Development:

This fire originated in the basement in an area with stored mattresses and cardboard. The cause is undetermined.

Contributing Factors and Other Details:

The fire spread via an open stairwell to the main floor, then to the second and third stories. Firefighters originally made an interior attack on the fire, but soon were forced to an exterior attack due to the deteriorating conditions, and also to protect nearby structures. Two firefighters were injured. The loss was estimated at \$4,522,000 to the structure and \$950,000 to the contents.

Type Occupancy: Stores and Office Properties

State: New Jersey

Dollar Loss: \$5,000,000

Month: May

Time: 10:42 AM

Property Characteristics and Operating Status:

This two-story shopping center covered 15,625 square feet (1,451 square meters). The type of construction was not reported. The mall was open and operating.

Fire Protection Systems:

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

Fire Development:

A fire of undetermined cause broke out in the attic area.

Contributing Factors and Other Details:

Arriving firefighters found the majority of the structure involved with fire and set up a defensives attack with master stream devices and exposure protection. The loss was estimated at \$4,000,000 to the structure and \$1,000,000 to the contents.

RESIDENTIAL PROPERTIES

Type Occupancy: Residential Properties

State: Pennsylvania

Dollar Loss: \$20,000,000

Month: November

Time: 11:35 AM

Property Characteristics and Operating Status:

This two- and three-story senior citizen living complex was of unprotected ordinary construction. The floor area was not reported. The building was occupied at the time of the fire.

Fire Protection Systems:

No information reported.

Fire Development:

No information reported.

Contributing Factors and Other Details:

No information reported.

Type Occupancy: Residential Properties

State: California

Dollar Loss: \$9,150,000

Month: December

Time: 1:04 AM

Property Characteristics and Operating Status:

This was a two-story single-family home. The type of construction and floor area were not reported. The home was occupied at the time of the fire.

Fire Protection Systems:

There was no detection or automatic suppression equipment present.

Fire Development:

This fire was caused by a short circuit in Christmas tree lighting. The fire spread rapidly throughout the home.

Contributing Factors and Other Details:

During fire suppression operations, a flashover occurred in the attic area next to the stairway where firefighters were working. There was a partial collapse of the roof and ceilings, which forced firefighters to withdraw to an exterior attack. The loss was estimated as \$9,000,000 to the structure and \$150,000 to the contents.

Type Occupancy: Residential Properties

State: Virginia

Dollar Loss: \$5,000,000

Month: January

Time: 10:45 AM

Property Characteristics and Operating Status:

This two-story single-family home covered 4,500 square feet (418 square meters), and was of unprotected wood-frame construction. The house was occupied at the time of the fire.

Fire Protection Systems:

There was complete coverage smoke detection equipment. The fire originated on the exterior of the house and spread into an area not covered by the system. It was not reported if detectors operated once the fire extended into the living area. There was no automatic suppression equipment present.

Fire Development:

Fireplace ashes were placed into a plastic trash container inside a wooden storage bin located outside the garage. The fire extended up the exterior of the vestibule connecting the house and garage. It then entered a void space below the roof and spread the length of the house in the attic.

Contributing Factors and Other Details:

One firefighter was injured. The loss was estimated at \$3,000,000 to the structure and \$2,000,000 to the contents.

Type Occupancy: Residential Properties

State: Massachusetts

Dollar Loss: \$5,000,000

Month: April

Time: 1:15 AM

Property Characteristics and Operating Status:

This three-story 24-unit condominium complex covered 20,000 square feet (1,858 square meters) and was of unprotected ordinary construction. Units were occupied at the time of the fire.

Fire Protection Systems:

There was a complete coverage combination heat and smoke detection system, with heat detectors in the units and smoke detection in the corridors and stairwells. The system operated and tripped a master box alerting the fire department. There was no automatic suppression equipment present.

Fire Development:

The occupant of the unit of origin on the second story arrived home, lit a candle on a coffee table, and left the room. When she reentered the room later, she found the table and part of the couch on fire. She tried to extinguish the fire with a glass of water. This proved unsuccessful and she left the unit, closing the door behind her. The sliding door to the balcony was open slightly and the fire spread out and up to the balcony above and into the eaves and into the attic storage area. Firefighters originally used an interior attack until the situation deteriorated and they withdrew for an exterior attack.

Contributing Factors and Other Details:

First-arriving fire companies found several people at windows awaiting rescue, and a fully-involved unit with fire showing out of the open slider door. Multiple alarms were sounded, bringing firefighters from 15 communities. Three occupants were rescued over ladders. Two firefighters were injured. The loss was estimated at \$4,000,000 to the structure and \$1,000,000 to the contents.

Type Occupancy: Residential Properties

State: Minnesota

Dollar Loss: \$5,500,000

Month: July

Time: 4:53 PM

Property Characteristics and Operating Status:

This three-story six-unit apartment house was of unprotected wood-frame construction and covered a floor area of 12,500 square feet (1,161 square meters). The building was occupied.

Fire Protection Systems:

There was a complete coverage smoke detection system present. The system was not a factor because the fire originated outside and spread into the building. It was not reported if the system operated or not. There was no automatic suppression equipment present.

Fire Development:

Carelessly discarded smoking materials ignited patio furniture on a second-story balcony. The fire extended to the third-story deck then into the attic area.

Contributing Factors and Other Details:

Firefighters made an interior attack on the fire in the attic but conditions deteriorated rapidly and crews withdrew to defensive operations. The loss was estimated at \$4,000,000 to the structure and \$1,000,000 to the contents.

WILDLANDS

Type Occupancy: Wildlands

State: Texas

Dollar Loss: \$95,246,750

Month: March

Time: 11:07 AM

Property Characteristics and Operating Status:

This grass and brush fire burned over 907,245 acres (367,149 hectares), and the fires in this complex burned over a nine-day period. This complex consisted of two large fires and six smaller fires.

Fire Development:

The fires started when the wind caused electric wires to touching and short out, causing sparks to ignite the ground cover.

Contributing Factors and Other Details:

The Panhandle area of the state had been in a drought for 11 months and under extremely critical drought conditions for five months. These conditions were ideal for grassfires. The day of the outbreak of fires, the sustained winds gusting winds were reported.

One firefighter and 11 civilians died in this complex of fires. The firefighter was killed and two other firefighters were injured when their fire apparatus overturned. Four people died in a nine-vehicle crash on the smoke-covered interstate. Four died when their vehicle ran off the road and the fire overran the occupants as they attempted to flee the fire. Three others died in their homes while preparing to evacuate. Destroyed in the fire were 89 structures, including nine houses, five vehicles, 1,040 electrical poles, and 2,000 miles (3,218 kilometers) of fence; 4,296 head of livestock perished. Eight towns were evacuated and a 90-mile (144-kilometer) stretch of the interstate was closed for nine hours after the crash, due to the blinding smoke conditions.

Type Occupancy: Wildlands

State: California

Dollar Loss: \$12,900,000

Month: December

Time: 2:30 A.M.

Property Characteristics and Operating Status:

Wildland/urban interface fire complex.

Fire Development:

An unspecified electrical equipment malfunction caused arcing that ignited ground vegetation.

Contributing Factors and Other Details:

This complex consisted of two fires, Shekel and Happy Camp. Extreme Red Flag conditions existed, with high winds up to 62 mph (99 kph), low relative humidity and low fuel moisture. Approximately 4,700 acres (1,902 hectares) burned. Twenty-five structures, 60 horse trailers, 22 vehicles, eight miles (3 hectares) of fence, and one bridge were damaged or destroyed. Two firefighters were injured.

Type Occupancy: Wildlands

State: California

Dollar Loss: \$11,690,000

Month: October

Time: 1:12 A.M.

Property Characteristics and Operating Status:

Wildland/urban interface fire.

Fire Development:

This incendiary fire was set in a wooded area. Fire spread was rapid and burned through heavy chaparral and Manzanita (evergreen shrubs and small trees) and into developed areas and destroyed 10 homes.

Contributing Factors and Other Details:

Five firefighters died while protecting homes in a cul-de-sac. The speed of spread and intensity of the fire rapidly overwhelmed the firefighters.

Type Occupancy: Wildlands

State: Texas

Dollar Loss: \$5,000,000

Month: January

Time: 2:30 P.M.

Property Characteristics and Operating Status:

Wildland/urban interface fire.

Fire Development:

A downed cross arm on an electric pole caused arcing and sparks, which ignited grass.

Contributing Factors and Other Details:

High winds, drought conditions, and low humidity were present. A total of 58 fire departments responded. Fifty-one structures were destroyed; another 11 suffered major damage and 13 had minor damage.

SPECIAL PROPERTIES

Type Occupancy: Special Properties

State: Washington

Dollar Loss: \$13,000,000

Month: March

Time: 12:05 A.M.

Property Characteristics and Operating Status:

This three-story 100-unit university dormitory was under construction. It was of unprotected wood-frame construction, and covered 15,000 square feet (1,393 square meters). No one was at the site when the fire broke out.

Fire Protection Systems:

It was not known if detection equipment was installed yet. There was no automatic suppression equipment.

Fire Development:

This was an incendiary fire. No additional information was reported.

Contributing Factors and Other Details:

None reported.

Type Occupancy: Special Properties

State: Colorado

Dollar Loss: \$6,000,000

Month: January

Time: 6:52 P.M.

Property Characteristics and Operating Status:

This four- to six-story multi-use building was under construction. It was of unprotected wood-frame construction and covered 40,000 square feet (3,716 square meters). There was to be retail and parking on the first-story and residences on the upper stories. It was not known if anyone was at the site when the fire broke out.

Fire Protection Systems:

No information was reported on detection equipment. There was an automatic suppression system present. No other information on the system was reported.

Fire Development:

The cause of this fire, which broke out on the first-story, is still under investigation.

Contributing Factors and Other Details:

None reported.

Type Occupancy: Special Properties

State: California

Dollar Loss: \$5,500,000

Month: October

Time: 3:45 A.M.

Property Characteristics and Operating Status:

This four-story hotel was under construction, and was of unprotected wood-frame construction. No information was reported on the ground floor area. No one was at the site when the fire broke out.

Fire Protection Systems:

No information reported.

Fire Development:

This was an incendiary fire. No further information can be released due to ongoing investigation.

Contributing Factors and Other Details:

None reported.

Type Occupancy: Special Properties

State: Ohio

Dollar Loss: \$5,000,000

Month: January

Time: 4:08 P.M.

Property Characteristics and Operating Status:

This approximately 4,000-foot (6,437-meter) long tunnel carried high voltage cables about 65 feet (19 meters) under ground. Workers were present in the buildings where the cables entered, but no one was in the tunnel when the fire broke out.

Fire Protection Systems:

No information was reported.

Fire Development:

The cause of this fire, which involved high-voltage cables and burned itself out, was undetermined. The tunnel was ventilated in a successful attempt to push the fire away from the nearby building that the cables entered.

Contributing Factors and Other Details:

One firefighter was injured at this fire.

EDUCATIONAL PROPERTIES

Type Occupancy: Educational Properties

State: Alaska

Dollar Loss: \$35,000,000

Month: August

Time: 6:00 AM

Property Characteristics and Operating Status:

This one-story elementary school covered 12,540 square feet (1,165 square meters) of unprotected wood-frame construction. The school was occupied at the time. This occurred in a remote village.

Fire Protection Systems:

There was a complete coverage of unknown type detection equipment present. The system operated. There was no automatic suppression equipment present.

Fire Development:

This incendiary fire was set under the schoolhouse. Due to high winds, the fire soon became a conflagration, spreading to 57 exposures, including 20 residential properties, three educational properties, 30 storage properties (including metal shipping containers), a store, a boiler room, a steam bath, and one other type of property. Also lost were multiple snow removal machines and other vehicles.

Contributing Factors and Other Details:

There was a delay in detecting the fire because it originated under the structure. The day of the fire, there were extremely high winds. Firefighters responded from villages and towns miles away.

Type Occupancy: Educational Properties

State: Arkansas

Dollar Loss: \$9,850,000

Month: August

Time: 2:23 PM

Property Characteristics and Operating Status:

This was a one-story middle, junior and high school of unprotected ordinary construction that covered 101,000 square feet (9,383 square meters). The school was in session when the fire broke out.

Fire Protection Systems:

There was a complete coverage combination heat and smoke detection system present. The system operated and alerted the occupants. There was no automatic suppression equipment present.

Fire Development:

Sparks or embers from a short in a light fixture ignited nearby combustibles. The fire burned into the attic and spread rapidly because of the wood-frame construction and plywood decking. Firefighters attacked the fire inside. When conditions worsened, firefighters evacuated the building and used elevated master streams.

Contributing Factors and Other Details:

The lack of detection and suppression equipment in the attic prevented early detection and intervention. To complicate matters for the firefighters, a severe thunderstorm passed through the area, forcing firefighters to shut down all master streams until it was safe to resume the battle. The loss was estimated at \$9,100,000 to the structure and \$750,000 to the contents.

Type Occupancy: Educational Properties

State: Hawaii

Dollar Loss: \$6,000,000

Month: June

Time: 3:15 PM

Property Characteristics and Operating Status:

This was a one-story K-12 charter school. No other information was reported.

Fire Protection Systems:

No information reported.

Fire Development:

No information reported.

Contributing Factors and Other Details:

None reported

VEHICLES

Type Occupancy: Vehicles

State: California

Dollar Loss: \$20,000,000

Month: June

Time: 12:34 PM

Property Characteristics and Operating Status:

This was an aircraft on a maintenance taxiway. Three airline employees were onboard for maintenance.

Fire Development:

As airline employees were conducting a ground run to troubleshoot reported engine problems, a backfire from a turbine engine caused a fire in the engine and wing area of this aircraft. Debris from the explosion caused several punctures in the fuel tanks. Leaking fuel ignited.

Contributing Factors and Other Details:

None reported.

Type Occupancy: Vehicles

State: California

Dollar Loss: \$5,000,000

Month: February

Time: 2:30 AM

Property Characteristics and Operating Status:

This fire originated in a yacht moored at a marina.

Fire Development:

Electrical arcing was reported to be the cause of the fire, but no other details were reported. The fire burned throughout the vessel, which sank. The fire also spread to, and destroyed, at least five other yachts and damaged two others.

Contributing Factors and Other Details:

Fire officials were unable to investigate the fire due to the sinking of the yacht. The loss was estimated at \$400,000 to the yacht of origin and \$4,600,000 to the exposures.

Type Occupancy: Vehicles

State: Texas

Dollar Loss: \$5,000,000

Month: September

Time: 8:13 AM

Property Characteristics and Operating Status:

This fire involved a vehicle at a gas well site. The vehicle was a pump truck delivering a slurry of sand and water at a pressure of 4,000 to 5,000 psi to break up shale and rock for drilling operations.

Fire Development:

An equipment malfunction ignited fuel from a fuel line on the vehicle.

Contributing Factors and Other Details:

The fire did not extend to the gas well.

PUBLIC ASSEMBLY PROPERTIES

Type Occupancy: Public Assembly Properties

State: Louisiana

Dollar Loss: \$10,000,000

Month: March

Time: 3:00 A.M.

Property Characteristics and Operating Status:

This fire started in a fast-food restaurant in a block of buildings. No other information reported.

Fire Protection Systems:

No information reported.

Fire Development:

No information reported.

Contributing Factors and Other Details:

None reported.

Type Occupancy: Public Assembly Properties

State: Tennessee

Dollar Loss: \$5,763,000

Month: October

Time: 2:39 A.M.

Property Characteristics and Operating Status:

This fire originated in a three-story church of unprotected ordinary construction. No other information reported.

Fire Protection Systems:

No information reported.

Fire Development:

No information reported.

Contributing Factors and Other Details:

None reported.

Type Occupancy: Public Assembly Properties

State: Oklahoma

Dollar Loss: \$5,000,000

Month: April

Time: 10:50 P.M.

Property Characteristics and Operating Status:

This university library covered 10,000 square feet (929 square meters) and was of protected noncombustible construction. The height was not reported. The library was in full operation as it was nearing final exams.

Fire Protection Systems:

There were smoke alarms present that operated and alerted occupants of the building. The coverage was not reported. There was no automatic suppression equipment present.

Fire Development:

A fire of undetermined origin broke out in the basement of this library. The fire burned books and a research collection of bound periodicals on several shelves. The fire also spread to manuscripts. The fire was contained to this area. There was smoke throughout the building.

Contributing Factors and Other Details:

None reported.

BASIC INDUSTRY, UTILITY PROPERTIES

Type Occupancy: Basic Industry, Utility Properties

State: Virginia

Dollar Loss: \$25,000,000

Month: January

Time: 9 PM

Property Characteristics and Operating Status:

This was an electrical power generation plant. This fire involved electric transformers in the switch yard. The height and capacity of the operating transformers was not reported. The plant was operating at the time.

Fire Protection Systems:

No detection or automatic suppression equipment was present.

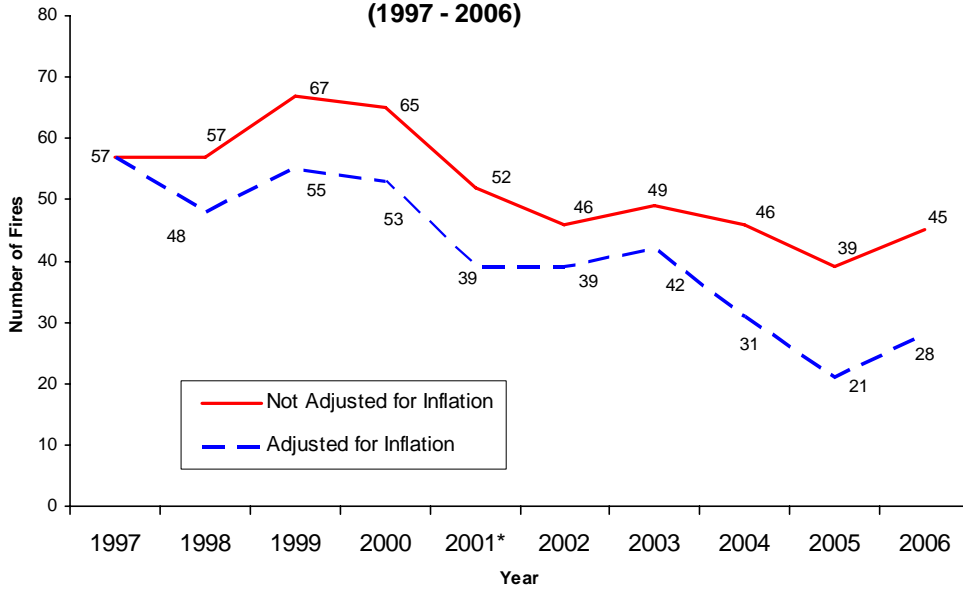
Fire Development:

A valve failed in a pipe assembly carrying cooling oil for several transformers. A pressurized leak occurred and the hot transformers ignited the oil. The fire impinged on two transformers and they ruptured, causing a significant flammable liquid fire. The fire also damaged a 30,000-square-foot (2,787-square-meter), six-story building.

Contributing Factors and Other Details:

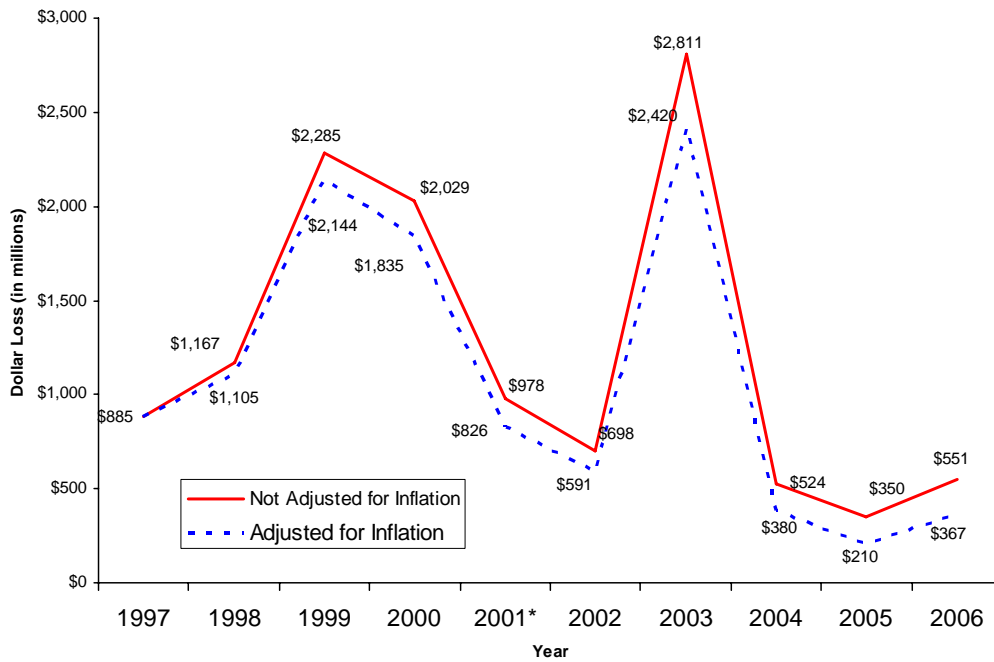
None reported.

Figure 1
Large-Loss Fires, Unadjusted and Adjusted for Inflation
(1997 - 2006)



Note: The 52 and 39 fires in 2001 do not include the 9/11/01 World Trade Center Incident

Figure 2
Direct Dollar Loss in Large-Loss Fires, Unadjusted and Adjusted
(1997-2006)



Note: Losses exclude the 9/11/01 World Trade Center Incident.

Figure 3. 2006 Large-Loss Fires by Major Property Use

