

# **LARGE-LOSS FIRES IN THE UNITED STATES – 2005**

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## **Acknowledgments**

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## **Introduction**

Shortly after noon on July 5, 2005, the fire department was alerted to a fire in a 100,000-square-foot (9,290.304-square-meter) sawmill. The one-story sawmill was of heavy-timber construction. A fire of undetermined cause broke out in the area of an electric motor above a dryer.

First arriving firefighters were told the fire was out, but they found a deep-seated fire. They extinguished the fire above the dryer area, but smoke and heat continued to build up. The fire burned in concealed areas until it spread to the heavy timber bowstring truss roof. There was a wet-pipe sprinkler system, but it was soon overwhelmed by the rapidly spreading fire. Several interior attacks were attempted. These attacks proved futile, and the firefighters were withdrawn as the fire spread to and through the truss roof. The mill was 80 percent destroyed and a large portion of the roof collapsed. The resulting loss was slightly more than \$23 million. Investigators determined there was a delay in contacting the fire department as mill employees attempted to extinguish the fire.

Just before midnight on February 4, 2005, a fire of still-undetermined cause broke out in a bio-laboratory that was under construction. The fire began in a room used to store construction equipment, three levels below ground. The fire was contained to the room of origin, but smoke spread throughout the 60,000-square-foot (5,574-square-meter) facility. Because this was a facility requiring a sterile environment, all previously installed equipment was damaged. It had to be removed and replaced.

Each year, 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 2005, fire departments in the United States responded to an estimated 1,602,000 fires. These fires caused an estimated loss of \$10.7 billion<sup>1</sup>. Many fires were small, with little or no property damage reported; however, 38 resulted in losses of \$5 million or more each<sup>2</sup>. Together, these large-loss fires resulted in \$344 million in direct property loss, killed two civilians, and injured 32 more, as well as injuring 48 firefighters. Despite the fact that these fires accounted for only .002 percent of all the fires estimated to have occurred in

the United States last year, they accounted for 3.2 percent of the total estimated dollar loss.

The direct property loss in large-loss fires was down by \$180 million or 34.4 percent from 2004.

Even before inflation adjustments, the number of large-loss fires in 2005 was the lowest in the 10 years since 1996. Actually, this was the lowest number of large-loss fires since 1987, when the \$5 million threshold was set (see Table 1, Figure 1, and Figure 2)<sup>3</sup>.

When adjusted for inflation to 1996 dollars, the number of fires that occurred in 2005 that could be categorized as large-loss (i.e., loss of \$5 million in 1996 dollars) drops to 21, with a total adjusted loss of \$205 million. This is also the lowest number of large-loss fires since 1996. The adjusted loss is the lowest in the 10-year period and 82 percent below the 10-year average adjusted loss total.

The sawmill fire and the bio-laboratory fire are two of sixteen fires that caused losses of \$10 million or more in property damage last year (see Table 2). Together these costliest 16 fires resulted in a combined loss of \$217 million. This represented 63.1 percent of the total losses reported in large-loss fires and 2 percent of the total losses in fires in the United States in 2005.

The number of large-loss fires and explosions and the losses in these fires are volatile and show no consistent trend from year to year. For 2005, all of the statistics and trends could be overshadowed by the loss in one fire, not included in the study, if there were an authoritative loss figure available for it (see sidebar on page 28).

### **Large-Loss Fire - A Case Study**

In March 2005, a violent explosion at a refinery in Texas killed 15 persons and injured 180. An explosion in the area of the pipe racks occurred when flammable liquid and vapor vented from a blow down drum during startup of the refinery's isomerization unit and were ignited by an unknown source. The explosion is still under investigation by the Chemical Safety Board. The explosion destroyed much of the facility's pipelines, several

tanks, and up to 44 trailers used by contractors as offices and storage areas. No dollar loss was reported for this incident to any of the many sources NFPA considers authoritative, including fire departments, other authorities having jurisdiction, or insurance companies. Media accounts varied widely but were all in the hundreds of millions of dollars. NFPA has never before recorded a fire with such a high loss in media accounts but no authoritative loss estimate.

Ten fires occurred in special properties, resulting in losses of \$102 million. Seven of these properties were under construction or undergoing renovations, two were vacant properties, and one was a highway overpass. Six fires each occurred in manufacturing properties and residential properties, resulting in losses of \$59 and \$47 million, respectively. Four fires each occurred in storage properties and public assembly properties (two of these were in restaurants, one involved a church, and one a Biblical Arts Center), resulting in losses of \$39 million and \$30 million respectively. Three fires occurred in retail and office properties (one in a mall and two in an office complex), resulting in losses of \$59 million. Two fires each occurred in educational properties and industrial properties. The losses were \$21 million and \$12 million, respectively. There was one vehicle fire with a loss of \$5 million.

All but one of the large-loss fires occurred in structures, with a combined loss of \$339 million. The other fire was in an aircraft, with a loss of \$5 million. Twenty of the properties were operating to some extent. Some 17 were at full operation; two were partially operating; and one had workmen at the site. Ten were closed and had no one on the property when the fire broke out. The operating status of the other seven properties was unknown or not reported.

Twenty of the 35 structure fires and the one vehicle fire had known causes. Five of the fires were intentionally set. These fires accounted for 24 percent of the fires and a loss of \$53 million or 27.2 percent of the dollar loss in large-loss fires with a reported cause.

Nine of the fires broke out between the hours of 11 p.m. and 7 a.m. Three of these fires were known to be unintentional and the cause was unknown on the other six. Four of

these properties were at full operation, three had no one on the property, and the operating status was unknown or reported on the other two fires.

### **Detection and suppression systems**

Information on detection equipment was reported for 27 of the 37 structure fires. Fourteen occurred in properties that had no automatic detection equipment present. Some form of detection equipment was present in 12 properties. Seven properties had smoke detection, four had combination smoke and heat detection, and one had detection equipment of an unreported type. This means that only 44 percent of the properties with automatic detection equipment reported had some sort of equipment. The coverage of the system was reported in only eight of the 12 properties. Seven properties had complete coverage. Three properties had combination heat and smoke detection; three with smoke detectors; and for one, the type of detection equipment was not reported. One structure had partial coverage with smoke detectors.

The operation of these systems was reported in 10 of the 12 fires. In eight of the fires, the systems operated and alerted the occupants; and in two cases, the systems did not operate. In one case where systems did not operate, the system had been shut down for construction work; and in the other, the power was out in the area after a hurricane and the residents had removed the back-up batteries for other uses. In one the operation was not reported.

Information on automatic suppression equipment was reported for 27 of the 37 structure fires. Of these 27 fires, 13, or 48 percent, were known to be equipped with automatic suppression equipment. Fourteen properties had no equipment present.

Four of the 13 protected properties had complete coverage systems. Two of these were wet-pipe sprinkler systems, one was a combination wet- and dry-pipe system, and the last one was a dry-pipe sprinkler. There were two with partial coverage sprinkler systems. One of these properties had a dry-pipe system and the other type was not reported. The coverage in the other seven properties was unknown or not reported.

Suppression equipment operated in eight of the 13 properties. In two of these fires, the systems operated as designed and controlled or assisted in control of the fires. Three systems operated but were overpowered by spreading fire; one system operated but was damaged during a collapse of the structure; one operated but was not in the area of ignition; and one operated but its effectiveness was not reported. (In one of the fires where the system was overwhelmed, the system was operating effectively until water pressure was lost.) In four incidents, the systems did not operate -- two were installed but not operational; one had been shut off before the fire; and one was heavily damaged during an explosion. No information was reported on the other two systems.

Of the 37 structure fires, 25 had complete information reported on both detection and suppression equipment. Ten properties, or 40 percent, had no automatic protection at all. Six properties had both detection and suppression equipment. Five had just a sprinkler system, while four had just detection equipment.

### **What we can learn?**

In 2005, the number of large-loss fires fell by 8, or 17 percent, and the property loss fell by \$180 million, or 34.4 percent. In eight of the past ten years, from 1996 to 2005, there has been at least one fire with a loss of over \$100 million. NFPA has no record of any confirmed loss of that size in 2005. (See sidebar on page 28 for additional information.)

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, and in several cases, the systems were installed but not operational. A look at Table 4 will identify these.

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. There were a range of ignition causes and factors reported among the large-loss fires in 2005, including mechanical failures, combustibles too close to heat

sources, and unattended equipment. Proper design, maintenance, and operation of fire protection systems and features can keep a fire 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**

NFPA identifies potential large-loss incidents by reviewing national and local news media, including fire service publications. A clipping service reads all U.S. daily newspapers and notifies NFPA's Fire Analysis and Research Division of major large-loss fires. 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 marshals' 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.

### **Endnotes**

1. "Fire Loss in the United States during 2005," Michael Karter Jr., NFPA Journal<sup>®</sup> September/October 2006.
2. The 38 large-loss fires of 2005 are those for which losses were reported and verified.
3. Numbers of fires and dollar loss may not show as the numbers in the years originally reported due to late arriving information.

**Table 1**  
**Large-Loss Fires that Caused \$5 million or More in Property Damage, 1996 - 2005**

| <b>Year</b> | <b>Number of Fires</b> | <b>Number of Fires Causing \$5 million or More in 1996 Dollars</b> | <b>Property Loss (unadjusted) (in millions)</b> | <b>Property Loss 1996 Dollars (in millions)</b> |
|-------------|------------------------|--------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| 1996        | 63                     | 63                                                                 | \$1,544                                         | \$1,544                                         |
| 1997        | 57                     | 42                                                                 | \$885                                           | \$792                                           |
| 1998        | 57                     | 47                                                                 | \$1,167                                         | \$1,075                                         |
| 1999        | 67                     | 55                                                                 | \$2,285                                         | \$2,096                                         |
| 2000        | 65                     | 53                                                                 | \$2,029                                         | \$1,793                                         |
| 2001*       | 52                     | 39                                                                 | \$978                                           | \$807                                           |
| 2002        | 46                     | 39                                                                 | \$698                                           | \$577                                           |
| 2003        | 49                     | 40                                                                 | \$2,811                                         | \$2,356                                         |
| 2004        | 46                     | 27                                                                 | \$524                                           | \$352                                           |
| 2005        | 38                     | 21                                                                 | \$344                                           | \$205                                           |

\* 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 1996 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 2005**

| <b>Incident and Location</b>                    | <b>Loss in Millions</b> |
|-------------------------------------------------|-------------------------|
| Sawmill, Oregon                                 | \$23                    |
| Laboratory under construction, Massachusetts    | 23                      |
| Single family home under renovation, California | 20                      |
| Cotton storage warehouse, Texas                 | 18                      |
| Apartment building, California                  | 16                      |
| Junior high school, Utah                        | 15                      |
| Vacant warehouse, Maryland                      | 11                      |
| Mall, 110 stores and eateries, Louisiana        | 11                      |
| Offices building, Florida                       | 10                      |
| Condominium under construction, Wisconsin       | 10                      |
| Club and restaurant, Florida                    | 10                      |
| Metal products machining, Ohio                  | 10                      |
| Church, Massachusetts                           | 10                      |
| Agriculture silo, Ohio                          | 10                      |
| Furniture manufacturing plant, Indiana          | 10                      |
| Freeway overpass, California                    | 10                      |
| <b>Total-16 Fires</b>                           | <b>\$217</b>            |

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

**Table 3**  
**2005 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 (in millions)</b> | <b>Percent of Loss</b> |
|------------------------|------------------------|-------------------------|----------------------------------------|------------------------|
| Special Properties     | 10                     | 26%                     | \$102                                  | 29.7%                  |
| Manufacturing          | 6                      | 16%                     | \$59                                   | 17.2%                  |
| Residential            | 6                      | 16%                     | \$47                                   | 13.7%                  |
| Storage                | 4                      | 11%                     | \$39                                   | 11.3%                  |
| Public Assembly        | 4                      | 11%                     | \$30                                   | 8.7%                   |
| Stores and Offices     | 3                      | 8%                      | \$29                                   | 8.4%                   |
| Educational            | 2                      | 5%                      | \$21                                   | 6.1%                   |
| Industry and Utilities | 2                      | 5%                      | \$12                                   | 3.5%                   |
| Vehicle                | 1                      | 3%                      | \$5                                    | 1.5%                   |
| Totals                 | 38                     | 100%                    | \$344                                  | 100.0%                 |

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

**Table 4**  
**Large-Loss Incidents of 2005**

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**SPECIAL PROPERTIES**

**Massachusetts**

**Dollar Loss:** \$23,000,000

**Month:** February

**Time:** 11 PM

**Property Characteristics and Operating Status:**

This underground bio-laboratory was under construction. The structure covered 60,000 square feet (5,574 square meters) and was three levels underground. The operating status was not reported.

**Fire Protection Systems:**

There was no fire detection or suppression equipment present.

**Fire Development:**

The fire broke out in a storage room containing construction equipment. The fire was contained to that room but smoke was throughout. The cause is still under investigation.

**Contributing Factors and Other Details:**

One firefighter was injured. At the time of the fire, the construction was 66 percent completed. The loss was high due to it occurring in a sterile environment and all installed equipment and construction had to be replaced.

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**California**

**Dollar Loss:** \$20,000,000

**Month:** October

**Time:** 9:20 PM

**Property Characteristics and Operating Status:**

This vacant two-story, 21-room English Tudor, single-family mansion was under going restoration. The home was of unprotected ordinary construction and covered 6,500 square feet (603 square meters). The site was closed for the night.

**Fire Protection Systems:**

There was no fire detection or suppression equipment present.

**Fire Development:** This incendiary fire was ignited after a flammable liquid was poured in the main entry way and a sunroom. The fire engulfed the first story and spread via an oak paneled stairwell to the second story and attic. When firefighters arrived, the house was well involved in fire.

**Contributing Factors and Other Details:**

This mansion had been used in several films.

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**Maryland****Dollar Loss:** \$11,000,000**Month:** May**Time:** 7 PM**Property Characteristics and Operating Status:**

This storage complex consisted of a one-story vacant warehouse of unprotected ordinary construction and a second warehouse of unprotected noncombustible construction and covered 100,000 square feet (9,290 square meters). The site was closed.

**Fire Protection Systems:**

There was no detection equipment present. There was a complete coverage dry-pipe sprinkler system present. The system was not operational, as it had been shut down when building became vacant.

**Fire Development:**

This was an incendiary fire. The fire caused a complete collapse of the older brick building and fire damage to the steel storage building.

**Contributing Factors and Other Details:**

Four firefighters were injured. The loss was \$10,000,000 to the structure and \$1,000,000 to the contents.

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**Wisconsin****Dollar Loss:** \$10,000,000**Month:** February**Time:** 10:20 PM**Property Characteristics and Operating Status:**

This fire originated in a three-story, eight-unit condominium building that was under construction. It was of unprotected wood-frame construction and covered 25,000 square feet (2,322 square meters). There were 34 buildings in the complex, and the fire ultimately involved nine buildings. Some were complete but unoccupied and some were still under construction. Two buildings were completed and occupied. No one was on the construction site when the fire broke out.

**Fire Protection Systems:**

There was no detection equipment installed yet. There was a sprinkler system present, but its type and coverage was not reported. The system was not operational.

**Fire Development:**

Before leaving for the day, workers placed a portable heating unit in an elevator shaft to melt ice. The heater overheated wood framing materials installed in the shaft. The fire spread, engulfing the structure and spreading to another building that was under

construction and a completed but unoccupied building. The fire department was notified by a neighbor in one of the occupied buildings. Upon arrival, firefighters found one building had burned to the ground, one was fully engulfed and one had upper stories burning.

**Contributing Factors and Other Details:**

The buildings in the complex were only 20 feet apart, allowing the fire to spread to two other buildings, and embers ignited spot fires on several other of the nine buildings in the area, as well as dumpsters and construction equipment.

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**California**

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

**Month:** November

**Time:** 7:48 AM

**Property Characteristics and Operating Status:**

Freeway overpass. It was in use by vehicular traffic. No details other details were reported.

**Fire Protection Systems:**

No fire detection or suppression equipment present.

**Fire Development:** A fire of undetermined cause broke out in a dry riverbed under this overpass. The cause is still under investigation.

**Contributing Factors and Other Details:**

One firefighter was injured. No other details were reported.

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**New York**

**Dollar Loss:** \$7,600,000

**Month:** September

**Time:** 3:15 AM

**Property Characteristics and Operating Status:**

This three-story single-family house was being renovated. No other information reported.

**Fire Protection Systems:**

No information reported.

**Fire Development:**

No information reported.

**Contributing Factors and Other Details:**

None reported.

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**New York****Dollar Loss:** \$5,500,000**Month:** November**Time:** 3:33 PM**Property Characteristics and Operating Status:**

This vacant one-story supermarket was of heavy-timber construction. The market covered 25,000 square feet (2,322 square meters) and was closed and boarded up.

**Fire Protection Systems:**

There was no detection equipment present. There was a partial coverage dry pipe sprinkler system, which did operate but its effectiveness was not reported.

**Fire Development:**

A shopping cart full of refuse was ignited and pushed into the middle of the store. The refuse inside the building ignited and fire spread throughout. Due to the degree of fire involvement upon firefighters' arrival, they initiated an exterior attack.

**Contributing Factors and Other Details:**

The building was mostly boarded up and vacant, resulting in a delay in discovery of the fire. A poor water supply allowed the fire to spread rapidly. One firefighter was injured.

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**Connecticut****Dollar Loss:** \$5,344,500**Month:** August**Time:** 12:56 AM**Property Characteristics and Operating Status:**

This three-story 37-unit hotel was under construction. The ground floor area was 7,800 square feet (724 square meters). The type construction was not reported. The site was closed for the night.

**Fire Protection Systems:**

There was no fire detection or suppression equipment present.

**Fire Development:**

The cause of this fire is under investigation. The fire fully consumed this building and spread to six other exposures.

**Contributing Factors and Other Details:**

None reported.

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**Montana****Dollar Loss:** \$5,000,000**Month:** March**Time:** 8:51 PM**Property Characteristics and Operating Status:**

This two-story assisted living complex was under construction. The building had unprotected wood-frame construction, covered 44,416 square feet (4,126 square meters), and had four wings. At the time of the fire, one wing was completely constructed; two wings had been framed, insulated and sheet rocked; and one wing was framed with some insulation and sheet rock. The site was closed for the night.

**Fire Protection Systems:**

There was no information reported on detection equipment. There was a partial installed sprinkler system present. The system was not operational.

**Fire Development:**

The fire originated in a portable-propane forced air heater. The heater was in an area where sheet rock was being installed.

**Contributing Factors and Other Details:**

There were several propane heaters throughout the structure.

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**Missouri****Dollar Loss:** \$5,000,000**Month:** October**Time:** 2:42 PM**Property Characteristics and Operating Status:**

This two-story food preparation plant was under construction. It was of protected noncombustible construction. The ground floor area was not reported. Workmen were on location with ongoing construction.

**Fire Protection Systems:**

There was unreported coverage smoke detection equipment present. The system had been shut off due to construction work. There was an unreported coverage wet-pipe sprinkler system present. The system was damaged during the explosion and it did not operate.

**Fire Development:**

An explosion and fire occurred when a natural gas valve was installed in the kitchen area and left in the open position and uncapped. The source of ignition is still under investigation.

**Contributing Factors and Other Details:**

One person died and 15 were injured in the explosion.

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## MANUFACTURING PROPERTIES

### Oregon

**Dollar Loss:** \$23,013,625

**Month:** July

**Time:** 12:42 PM

### Property Characteristics and Operating Status:

This one-story sawmill was of heavy-timber construction and covered a ground floor area of more than 100,000 square feet (9,290 square meters). The mill was at full operation at the time of the fire.

### Fire Protection Systems:

There was no detection equipment present. There was an unreported coverage wet-pipe sprinkler system present. The system operated but was overpowered by the spreading fire.

### Fire Development:

The fire originated in the area of an electric motor above a dryer. The exact heat source and first materials ignited were still under investigation. The fire burned in hidden areas until it spread to the heavy timber bowstring truss roof construction. Several interior attacks were attempted but the fire was very deep-seated and firefighters were withdrawn for an exterior attack. Shortly after this, there was a structural collapse.

### Contributing Factors and Other Details:

There was a long delay in notifying the fire department while workers attempted to extinguish the fire. Firefighters were told upon arrival the fire was out, but on investigation, firefighters found a deep-seated fire. Three firefighters were injured. The loss was \$5,013,000 to the structure and \$18,000,625 to contents.

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### Ohio

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

**Month:** March

**Time:** 8 AM

### Property Characteristics and Operating Status:

This one-story metal product machining plant was of unprotected noncombustible construction and covered a ground floor area of 65,254 square feet (6,062 square meters). The plant was in full operation at the time of the fire.

### Fire Protection Systems:

There was no fire detection or suppression equipment present.

**Fire Development:**

Sparks from a hole-boring machine ignited coolant oil that was on the machine to cool the drill bit. The fire spread through a trough under the floor and ignited the flooring, as well as oil in a 3,000-gallon (11,356-liter) holding tank. During firefighting and ventilation operations, the roof became unstable and firefighters were withdrawn from the building. Foam units assisted firefighters in extinguishing the fire.

**Contributing Factors and Other Details:**

Oil run off became a concern and extra fire department and HAZMAT crews were dispatched. The loss was \$2,000,000 to the structure and \$8,000,000 to the contents.

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**Indiana**

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

**Month:** September

**Time:** 11:59 PM

**Property Characteristics and Operating Status:**

This outdoor furniture and cushion manufacturing plant was of unprotected ordinary construction and had a ground floor area of 279,000 square feet (25,919 square meters). The height was not reported. The plant was in full operation.

**Fire Protection Systems:**

There was no detection equipment present. There was a complete coverage combination wet- and drypipe sprinkler system. The system operated but risers were heavily damaged by a roof collapse.

**Fire Development:**

The fire broke out in a woodworking area. The ignition sequence is still under investigation.

**Contributing Factors and Other Details:**

Over the years, the building had many add-ons and multiple roofs that firefighters had to work through to reach to the fire.

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**Michigan**

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

**Month:** November

**Time:** 10:15 AM

**Property Characteristics and Operating Status:**

No information on this metal product manufacturing plant was reported.

**Fire Protection Systems:**

No information reported.

**Fire Development:**

No information reported.

**Contributing Factors and Other Details:**

None reported.

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**Wisconsin**

**Dollar Loss:** \$5,039,000

**Month:** July

**Time:** 6:23 PM

**Property Characteristics and Operating Status:**

This one-story plastic product plant was of unprotected noncombustible construction. The plant covered 3,500 square feet (325 square meters) and was partially operating. A few employees were still at the plant.

**Fire Protection Systems:**

There was no fire detection or suppression equipment present.

**Fire Development:**

The cause of this fire is undetermined. It broke out in the area of a workbench in a manufacturing area. The fire spread up to an open mezzanine where it ignited plastic and molds stored in the area and extended across the ceiling. Firefighters found heavy smoke on arrival and attempted an interior attack. As the conditions worsened, the firefighters were withdrawn for an exterior attack.

**Contributing Factors and Other Details:**

The loss was listed as \$539,000 to the structure and \$4,500,000 to the contents.

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**Pennsylvania**

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

**Month:** September

**Time:** 6:55 PM

**Property Characteristics and Operating Status:**

This one-story paper recycling plant was of unprotected noncombustible construction and covered 25,000 square feet (2,322 square meters). The plant was in full operation at the time of the fire.

**Fire Protection Systems:**

There was no fire detection or suppression equipment present.

**Fire Development:**

This fire started outside the building. The cause is still under investigation. The large quantity of combustibles and a high wind caused the fire to spread into and consumed the entire building.

**Contributing Factors and Other Details:**

None reported.

## **RESIDENTIAL PROPERTIES**

### **California**

**Dollar Loss:** \$16,000,000

**Month:** July

**Time:** 2:35 AM

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

This three-story six-unit apartment building was of protected wood-frame construction and covered 3,500 square feet (325 square meters). The building was occupied.

#### **Fire Protection Systems:**

There was a single-station smoke alarm present in the unit of origin. The system did operate. There was no suppression equipment present.

#### **Fire Development:**

A spark or flame from equipment (type not reported) in the kitchen ignited nearby combustibles.

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

Six civilians were injured. The loss was listed as \$10,000,000 to the structure and \$6,000,000 to the contents.

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### **Florida**

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

**Month:** October

**Time:** 6:47 AM

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

This one-story single-family house was of unprotected ordinary construction and covered 11,000 square feet (1,021 square meters). The house was occupied by one adult and six juveniles sleeping.

#### **Fire Protection Systems:**

There was a complete coverage of smoke alarms. However due to a power loss caused by a recent hurricane the back up batteries were removed and used elsewhere. There was no fire suppression equipment present.

#### **Fire Development:**

Winds of 30 to 45 miles per hour (48 to 72 kilometers per hour) blew a window covering into an unattended candle left burning in a first-story room. Other combustibles were soon involved and by the time, the occupants detected the fire the room was well involved and spreading to the attic and hallway area. Firefighters initially made an interior attack until they noticed the roof was sagging. Firefighters evacuated the building just as the roof collapsed.

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

Water supply was a problem for firefighters. There were no fire hydrants on the street. Drafting operations were begun to supplement water flow. One civilian was injured. The loss was \$7,000,000 to the house and \$1,500,000 to the contents.

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**New Jersey**

**Dollar Loss:** \$7,100,000

**Month:** September

**Time:** 1:41 PM

**Property Characteristics and Operating Status:**

This four-story eight-unit condominium was of unprotected wood-frame construction and covered 4,225 square feet (392 square meters). The building was occupied.

**Fire Protection Systems:**

There was complete coverage smoke detection equipment. The alarms sounded, but with a delay due to the fire's area of origin. There was a complete coverage wet-pipe sprinkler system present. There was no coverage in the area of ignition (outside). Upon arrival, the fire department pumped into the sprinkler system, but there was no effect on the fire spread.

**Fire Development:**

This exposure fire began in the engine compartment of a car parked in a garage under the condominium structure. The garages were separated by wood latticework that allowed the fire to spread through the eight garages that contained vehicles, boats, and propane grills. The fire spread up cedar siding and through the truss floor assembly of the condominium units above. The fire spread to several other buildings in the condominium complex. At least 35 fire departments responded to fight the fire.

**Contributing Factors and Other Details:**

The day of the fire was very hot and humid, with a wind of 15 to 20 miles per hour (24 to 32 kilometers per mile). There had been no rain for three weeks, causing the siding to be very dry. One side of the structure was on a bay, forcing firefighters to hand lay fire hoses. The open-web truss construction of floors and roof allowed for rapid spread. Twenty-four firefighters and three civilians were treated for heat exhaustion and other injuries. The loss was \$6,000,000 to structures and \$1,100,000 to contents.

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**Maryland**

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

**Month:** January

**Time:** 1:30 PM

**Property Characteristics and Operating Status:**

This three-story apartment building was of unprotected ordinary construction. The ground floor area was not reported. The building was occupied at the time of the fire.

**Fire Protection Systems:**

No information was reported.

**Fire Development:**

A plumber sweating pipes in a tight area between the studs ignited wood structural members in a wall space between the kitchen and bathroom. There are no additional details available on fire spread.

**Contributing Factors and Other Details:**

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

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**Massachusetts**

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

**Month:** April

**Time:** 1:23 PM

**Property Characteristics and Operating Status:**

This six-story 20-unit off-campus college dormitory was of unprotected ordinary construction. The ground floor area was 2,400 square feet (222 square meters) and was occupied at the time of the fire.

**Fire Protection Systems:**

There were smoke and heat detectors present. The coverage was not reported but they did operate and alerted occupants. There was a sprinkler system present, but no information on it was reported.

**Fire Development:**

A spark or ember from a heater ignited combustibles in a heating equipment room.

**Contributing Factors and Other Details:**

None reported.

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**New Jersey**

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

**Month:** August

**Time:** 4:45 PM

**Property Characteristics and Operating Status:**

This fire originated in a single family home and spread to at least ten other structures. No details were reported on the property, or whether or not it was occupied.

**Fire Protection Systems:**

No information reported.

**Fire Development:**

No information reported.

**Contributing Factors and Other Details:**

Twelve firefighters injured.

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## **STORAGE PROPERTIES**

### **Texas**

**Dollar Loss:** \$18,000,000

**Month:** December

**Time:** 2:06 PM

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

This was a cotton storage facility of unprotected noncombustible construction was operating. The height and area were not reported.

### **Fire Protection Systems:**

No information on detection equipment was reported. There was a sprinkler system in the building. The coverage and type was not reported. The system operated but was overwhelmed by the spreading fire.

### **Fire Development:**

This was an exposure fire. A welder working in a livestock auction facility unintentionally ignited hay in a pen. The fire spread to grass and then across a road to cotton bales, and into the storage building.

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

High winds spread the fire very rapidly. Embers blowing from the fire ignited several smaller fires in town. Ten fire departments were called to assist.

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### **Ohio**

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

**Month:** July

**Time:** 3:41 PM

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

This agriculture storage silo was of unprotected noncombustible construction. The height and ground floor area was not reported. The facility was partially operating at the time of the fire.

### **Fire Protection Systems:**

There was an unreported coverage of smoke detection equipment present. The system did operate. There was no information reported on fire suppression equipment.

### **Fire Development:**

Agriculture products in the form of grain were ignited by an unknown source. The cause is still under investigation

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

None reported.

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**Virginia**

**Dollar Loss:** \$5,926,000

**Month:** September

**Time:** 8:53 AM

**Property Characteristics and Operating Status:**

This wood furniture storage warehouse was of fire resistive construction. The height and ground floor area was not reported. The warehouse was open and operating.

**Fire Protection Systems:**

No information was reported on detection equipment. There was a wet pipe sprinkler system present, as well as an in-rack system. The coverage was not reported but it operated and held the fire in check.

**Fire Development:**

This incendiary fire was ignited by an employee using plastic wrap and an open flame. The fire spread to at least five racks of furniture.

**Contributing Factors and Other Details:**

The fire was able to spread through the racks because of plywood shelving that hampered the water flow to the fire. Once the fire spread beyond the racks, the overhead sprinklers operated.

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**California**

**Dollar Loss:** \$5,200,000

**Month:** November

**Time:** 7:15 PM

**Property Characteristics and Operating Status:**

This two-story film warehouse was of protected noncombustible construction and covered 202,248 square feet (18,789 square meters). The warehouse was operating.

**Fire Protection Systems:**

There was complete coverage combination smoke and heat detection equipment that operated. There was a complete coverage wet pipe sprinkler system present. The system operated with four heads flowing and held the fire in check.

**Fire Development:**

Overheated fluorescent light ballast ignited palletized film and paper.

**Contributing Factors and Other Details:**

The loss was \$200,000 to the structure and \$5,000,000 to the contents.

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## **PUBLIC ASSEMBLY PROPERTIES**

### **Florida**

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

**Month:** January

**Time:** 7 PM

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

Officers club and restaurant at an Air Force base. No other details were reported.

### **Fire Protection Systems:**

No information reported.

### **Fire Development:**

No information reported.

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

None reported.

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### **Massachusetts**

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

**Month:** June

**Time:** 10:01 PM

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

This church was 75 feet (22 meters) high to the roof peak and 100 feet (30 meters) to the top of the steeple. It was of unprotected ordinary construction and covered a ground floor area of 20,000 square feet (1,858 square meters). No one was in the church when the fire broke out.

### **Fire Protection Systems:**

There was complete coverage of combination smoke and heat detection equipment present. This system activated a master firebox and alerted the fire department. There was no fire suppression equipment present.

### **Fire Development:**

This fire broke out in a basement storage room. Extremely humid air and a lack of circulation around a residential-type refrigerator caused a compressor motor to overheat. Wire insulation ignited and spread to plaster lathe wall. The fire entered the wall through an area of deteriorated plaster and ignited the wood lathe in an uninsulated void space. From there, the fire traveled to the roof area. The fire burned in the room of origin until sufficient heat built up to activate a heat detector.

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

Five firefighters were injured. Fire apparatus responded from 10 nearby departments. The loss was \$9,000,000 to the structure and \$1,000,000 to the contents.

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**California**

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

**Month:** April

**Time:** 7:55 AM

**Property Characteristics and Operating Status:**

This restaurant was in a two-story strip mall of unprotected wood-frame construction. The mall contained eight units and covered a floor area of 20,000 square feet (1,858 square meters). The restaurant was closed at the time of the fire.

**Fire Protection Systems:**

There was no fire detection or suppression equipment present.

**Fire Development:**

The fire originated in a concealed space above the ceiling and below the second floor. Due to the destruction, no cause was determined.

**Contributing Factors and Other Details:**

Three firefighters were injured. The loss was \$4,500,000 to the structure and \$500,000 to the contents.

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**Texas**

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

**Month:** June

**Time:** 11:25 AM

**Property Characteristics and Operating Status:**

This one-story arts center was of unprotected ordinary construction. The gallery covered 120,000 square feet (11,148 square meters) and was open for visitors.

**Fire Protection Systems:**

There was complete coverage smoke detection equipment. The system was not in the area of origin, and it was not reported if the system operated. There was no suppression equipment present.

**Fire Development:**

This fire was caused by an electrical short circuit in a large enclosed area above the ceiling of an audiovisual room.

**Contributing Factors and Other Details:**

Firefighters had difficulty reaching the fire because a second dome-like structure had been built over the original one, creating voids for fire spread. The loss was estimated at \$2,500,000 to the structure and \$2,500,000 to the contents.

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## STORES AND OFFICE PROPERTIES

### Louisiana

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

**Month:** September

**Time:** 12:57 PM

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

This L-shaped, one-story mall of unprotected ordinary construction had a floor area of 100,000 square feet (929 square meters) and contained 110 stores and eateries. The operating status was not reported.

#### **Fire Protection Systems:**

There was smoke detection equipment present. The coverage and operation was not reported. There was a wet pipe sprinkler system of unreported coverage. The system did operate as designed until pressure was lost to the system. By the time the fire department re-established water flow and pressure to the system, the fire had overwhelmed the system and 100 sprinklers operated.

#### **Fire Development:**

This incendiary fire was set in a show room of a mall store in wearing apparel. The fire spread to and destroyed 15 stores in one wing of the building, and caused smoke and water damage to the rest of the mall.

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

The loss was \$8,000,000 to the structure and \$3,000,000 to the contents.

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### Florida

**Dollar Loss:** \$10,020,000

**Month:** June

**Time:** 6:59 AM

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

This two-story commercial property contained two offices and a tanning salon. It was of unprotected ordinary construction and covered a floor area of 16,500 square feet (1,532 square meters). The building was closed for the night.

#### **Fire Protection Systems:**

There was no fire detection or suppression equipment present.

#### **Fire Development:**

An electrical short in ballast to a fluorescent light on the ceiling of a second-story storeroom started this fire, which spread through the void space between the ceiling and roof then down into the second story. An employee arriving for work discovered the fire.

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

Six firefighters were injured. The loss was \$4,020,000 to the structure and \$6,000,000 to the contents.

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## EDUCATIONAL PROPERTIES

### Utah

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

**Month:** July

**Time:** 12:34 PM

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

This one-story junior high school was of unprotected ordinary construction. The ground floor area covered 160,000 square feet (14,864 meters). Classes were in session when the fire broke out.

### **Fire Protection Systems:**

There was a complete coverage system of smoke detection equipment that operated and alerted the students and staff. No information was reported on fire suppression equipment.

### **Fire Development:**

A fire of undetermined cause broke out in a computer room.

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

The loss was \$13,000,000 to the structure and \$2,000,000 to the contents.

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## BASIC INDUSTRY, UTILITY PROPERTIES

### Ohio

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

**Month:** November

**Time:** 5:10 AM

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

Electrical substation transformers were in operation when the fire broke out.

### **Fire Protection Systems:**

No information reported.

### **Fire Development:**

The fire broke out in an electrical transformer. The cause was undetermined.

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

The fire involved two transformers. The fire was extinguished with foam after the power had been cut off.

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**Ohio**

**Dollar Loss:** \$5,054,400

**Month:** September

**Time:** 10:54 PM

**Property Characteristics and Operating Status:**

No details were reported on this flammable liquids bulk storage plant. The operating status was not reported.

**Fire Protection Systems:**

No information reported.

**Fire Development:**

This explosion and fire originated in a switchgear area when an unspecified short circuit caused an electrical arc to ignite flammable gas.

**Contributing Factors and Other Details:**

The plant contained LP gas, butane, gasoline, and diesel fuel. One person was killed in the explosion. The loss was \$3,054,400 to the structure and \$2,000,000 to the contents.

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**VEHICLES**

**Texas**

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

**Month:** November

**Time:** 6:12 PM

**Property Characteristics and Operating Status:**

A commercial jet fire at the aircraft loading area caught fire.

**Fire Protection Systems:**

Not reported.

**Fire Development:**

During an improper start up, an engine backfire ignited JP-4 fuel.

**Contributing Factors and Other Details:**

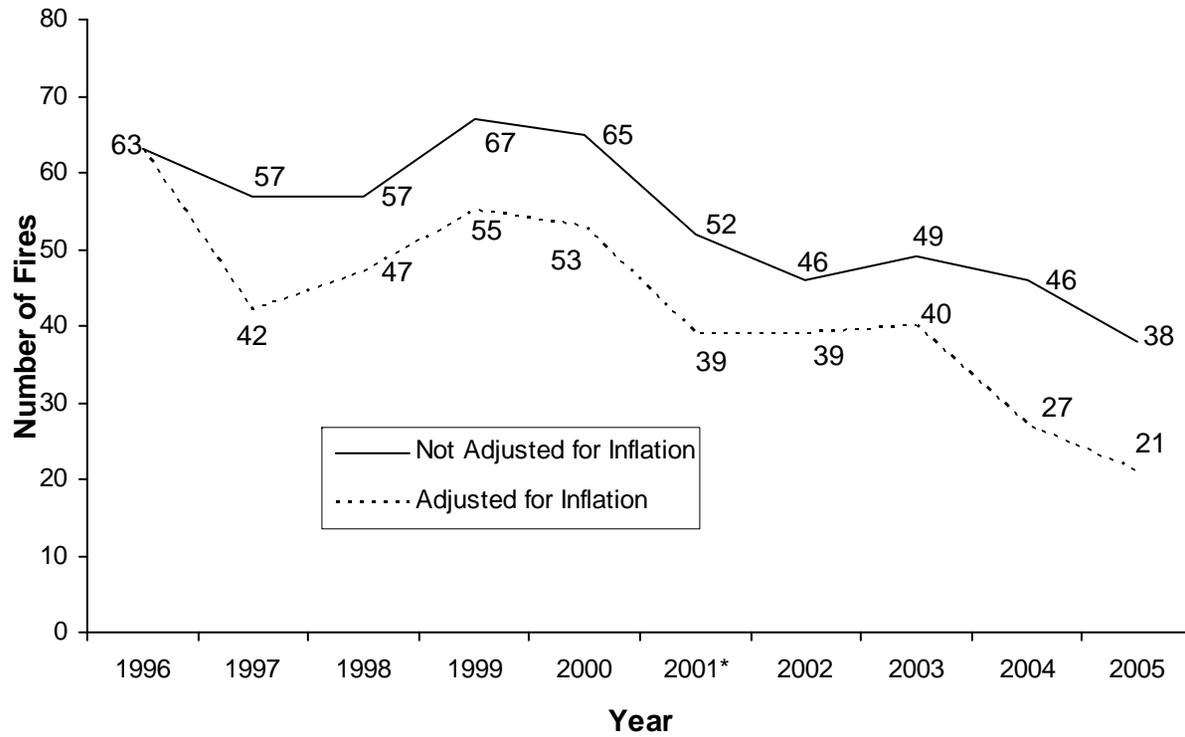
No other details were reported.

## SIDEBAR

### **No Authoritative Loss Estimate Available for Refinery Fire**

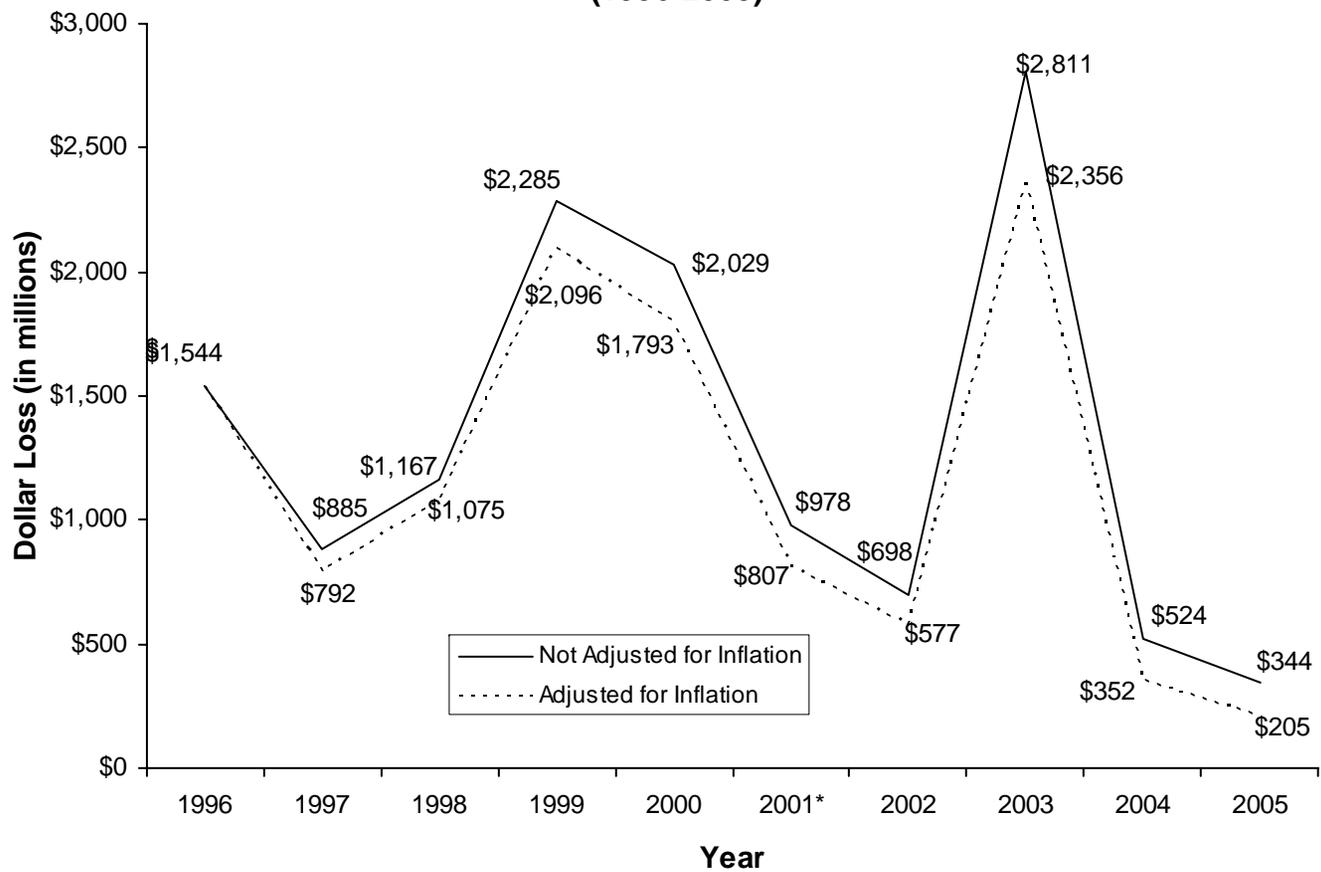
In March 2005, a violent explosion at a refinery in Texas killed 15 persons and injured 180 people. An explosion in the area of the pipe racks occurred when flammable liquid and vapor vented from a blow down drum during startup of the refinery's isomerization unit and were ignited by an unknown source. The explosion is still under investigation by the Chemical Safety Board. The explosion destroyed much of the facility's pipelines, several tanks, and up to 44 trailers used by contractors as offices and storage areas. No dollar loss was reported for this incident to any of the many sources NFPA considers authoritative, including fire departments, other authorities having jurisdiction, or insurance companies. Media accounts varied widely but were all in the hundreds of millions of dollars. NFPA has never before recorded a fire with such a high loss in media accounts but no authoritative loss estimate.

**Figure 1**  
**Large-Loss Fires, Unadjusted and Adjusted for Inflation**  
**(1996 - 2005)**



\*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**  
**(1996-2005)**



\*Losses exclude the 9/11/01 World Trade Center Incident



**Figure 3.**  
**2005 Large-Loss Fires by Major Property Use**

