

# **U.S. Fire Administration TOPICAL FIRE RESEARCH SERIES**

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## **The Dangers of Fireworks**

### **FINDINGS**

- Fireworks were the cause of 13 fatalities, 8,500 injuries, 7,000 fires, and \$40 million in property loss in 1998.
- State laws regulating the sale of fireworks have a direct impact on the incidence of loss. More stringent laws have been responsible for a decrease in injuries in the last decade—from a high of 12,100 in 1990 to a low of 7,800 in 1996.
- 70-75% of fireworks injuries occur during a 30-day period (June 23-July 23). In addition to Independence Day, other peak periods for injuries are New Year's Eve and other holidays.
- 45% of fireworks injuries are to children under the age of 15. Males are three times more likely than females to be injured.

Fireworks are enjoyable and exciting to watch, but each year they injure thousands of people, many of them children, and cause thousands of fires. Federal and state laws prohibit the sale of certain types of fireworks, but even those that are legal can be dangerous. For example, sparklers, which are legal in the majority of states, burn at temperatures of approximately 2,000°F.<sup>1</sup>

To prevent injuries and property loss from fireworks, the federal government has banned the sale of the most dangerous types (Class B fireworks). These include M-80s, cherry bombs, firecrackers containing more than 50 milligrams of black powder, and mail order kits for building fireworks.

Working with the U.S. Customs Office, the Consumer Product Safety Commission has seized nearly 400 million pounds of illegal fireworks at U.S. docks since 1988.<sup>2</sup>

Federal, state, and local laws govern the manufacture and sale of legal fireworks (Class C).<sup>3</sup> Thirty-three states and the District of Columbia allow some or all types of consumer fireworks. Nevada has no fireworks laws except at the county levels. Six states allow only sparklers or other novelties:

Illinois      Maryland  
 Iowa         Ohio  
 Maine        Pennsylvania

Ten states ban all consumer fireworks:

Arizona      Minnesota  
 Connecticut   New Jersey  
 Delaware     New York  
 Georgia      Rhode Island  
 Massachusetts Vermont

Studies have suggested that state laws regulating the sale of fireworks directly affect the occurrence of fireworks-related injuries. In one state, the number of injuries seen in emergency departments more than doubled following the legalization of fireworks.<sup>4</sup>

An estimated 8,500 people sought treatment for fireworks-related injuries in 1998. Forty-five percent of those were children under the age of 15.<sup>5</sup> Further, fireworks caused 13 fatalities.<sup>6</sup> Despite the increasing consumption of fireworks over the last decade, fireworks injuries have actually decreased (Figure 1). This trend is possibly due to the increasing popularity of large, professionally executed public fireworks displays, which use thousands of pounds of fireworks and rarely cause injuries.

**Figure 1. Rate of Fireworks-Related Injuries per 100,000 Pounds of Fireworks<sup>7</sup>**

YEAR	FIREWORKS CONSUMPTION (millions lb)	ESTIMATED FIREWORKS-RELATED INJURIES	INJURIES/100,000 LB OF FIREWORKS
1990	67.6	12,100	17.8
1991	71.7	11,000	14.9
1992	87.1	12,600	14.5
1993	101.9	12,300	12.0
1994	117.0	12,500	10.7
1995	115.0	10,900	9.4
1996	118.0	7,800	6.2
1997	132.9	8,300	6.2

Despite this downward trend, fireworks remain dangerous. Each year, newspapers report numerous instances of people injured or killed by fireworks. Examples include:

- On July 6, 2000, a man was killed while launching powerful, professional-caliber rockets near a friend’s home. He apparently leaned over the rocket when it did not immediately launch and was struck in the head when the rocket fired several seconds later.<sup>8</sup>
- In a similar accident, a New York man was killed when he peered into the mouth of a launch tube for an aerial bomb. When the charge initially failed to fire, he looked inside the mortar tube and was nearly decapitated when the charge went off several seconds later.<sup>9</sup>

- In Colorado, a 10-inch mortar shell thought to be a dud exploded after a fireworks display had concluded. Six firefighters standing nearby were taken to the hospital for hearing tests.<sup>10</sup>
- In Iowa, a teenager was killed and five were injured when fireworks thrown from their sport utility vehicle blew back into the vehicle, causing a fire and a crash.<sup>11</sup>

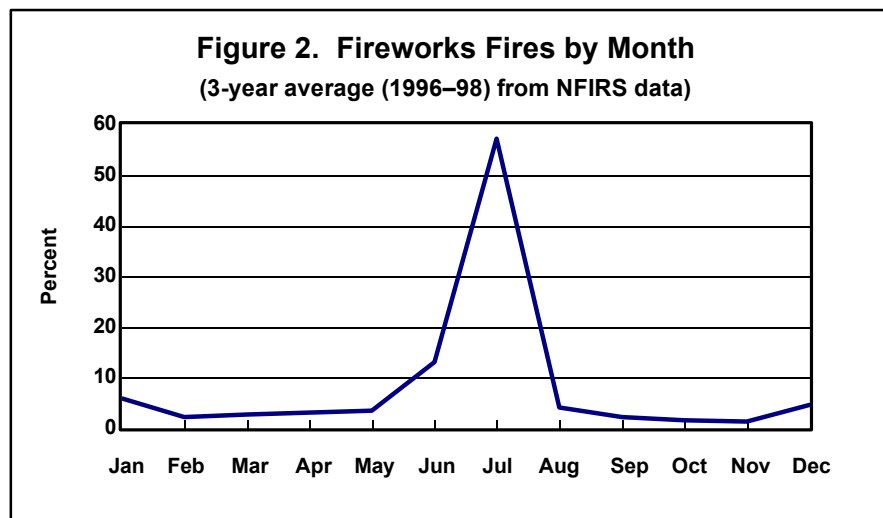
Of injuries caused by fireworks:

- 70 to 75% occur during a 30-day period surrounding July 4 (June 23– July 23)
- Seven out of 100 persons injured require hospitalization
- Males are three times more likely than females to be injured
- Boys between the ages of 10 and 14 have the highest rates of injury
- Common injuries are to the hands (34%), face (12%), and eyes (17%).<sup>12</sup>

The following discussion is based on a 3-year average using 1996–98 National Fire Incident Reporting System (NFIRS) data and reflects injuries, fatalities, and fire loss associated with *fires* caused by fireworks, which are different from the figures presented earlier that reflect injuries, fatalities, and property loss caused *directly* by fireworks.

Fireworks fires cause approximately \$15 million in property loss, injure 50, and kill 15 annually. Most fires are clustered around Independence Day, New Year’s Eve, and other holidays or celebrations.

Fifty-seven percent of fires caused by fireworks occur in July, and nearly 20% occur on July 4 (Figure 2). The majority are in open fields or vacant lots.



As such, the materials most commonly ignited by fireworks are grass, leaves, straw, and rubbish. These types of fires have a relatively low property loss.

Given the high number of children injured by fireworks, it is not surprising that the most common ignition factor for fires related to fireworks is children playing with or otherwise misusing fireworks.

Casualties from fireworks fires are somewhat less than those from all fires (Figure 3), and property loss is significantly less because most fireworks fires are outside fires with lower dollar value than structure fires.

<b>Figure 3. Loss Measures From Fireworks</b> (3-year average (1996–98) from NFIRS data)		
<b>MEASURE</b>	<b>ALL FIRES</b>	<b>FIREWORK FIRES</b>
<b>Dollar Loss/Fire</b>	<b>\$5,619</b>	<b>\$2,295</b>
<b>Injuries/1,000 Fires</b>	<b>15.7</b>	<b>8.5</b>
<b>Fatalities/1,000 Fires</b>	<b>2.4</b>	<b>1.8</b>

In addition to civilian injuries, fireworks fires are also deadly to firefighters. For example, in separate 1998 incidents in Alabama and Oklahoma, two firefighters were killed as a result of fires caused by fireworks.<sup>13</sup>

Because fireworks can be dangerous and deadly, the safest way to enjoy them is through public displays conducted by professional pyrotechnicians hired by communities over July 4 or at other times during the year.

## NOTES

1. “CPSC Holds Fireworks Safety Press Conference on Mall in Washington,” Press Release, Consumer Product Safety Commission (CPSC), June 28, 2000.
2. *Federal and State Regulations*, CPSC.
3. Ibid.
4. Centers for Disease Control and Prevention, “Serious Eye Injuries Associated With Fireworks, United States 1990–1994,” *Morbidity and Mortality Weekly Report*, 1995; 44: 449–452.
5. Press Release, CPSC, June 28, 2000, loc. cit.
6. National Electronic Injury Surveillance System, CPSC.
7. American Pyrotechnics Association.
8. Rozek, Dan and Main, Frank, “Fireworks Accident Kills Lombard Man,” *Chicago Sun–Times*, July 6, 2000.
9. “Fireworks Accident Kills New York Man, Cause Injuries Elsewhere,” *The Associated Press*, July 5, 2000.
10. Ibid.
11. “National Briefs,” *The Houston Chronicle*, July 6, 2000.
12. Centers for Disease Control and Prevention, “Injuries From Fireworks in the United States,” *Morbidity and Mortality Weekly Report*, 2000, June 23; 49 (24): 545–546.
13. USFA Fallen Firefighters database.

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