

# **2000 Fireworks Annual Report**

# Fireworks-Related Deaths, Emergency Department Treated Injuries, and Enforcement Activities During 2000

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#### Executive Summary

This report provides the results of the U. S. Consumer Product Safety Commission (CPSC) staff analysis of data on fireworks-related injuries and deaths during 2000. The report also includes a summary of CPSC enforcement activities during that year.

We obtained information on fireworks deaths primarily from news clips in CPSC's Injury and Potential Injury Incident (IPII) database. We estimated fireworks injuries from CPSC's National Electronic Injury Surveillance System (NEISS). More detailed analyses of injuries including the type of injury and the firework involved were based on a special study conducted between June 23 and July 23, 2000.

Highlights of the report are as follows:

- CPSC has reports of 10 deaths from fireworks in 2000. We have reports of 17 deaths that occurred in 1999.
- Fireworks devices were involved in an estimated 11,000 injuries treated in U. S. hospital emergency departments during calendar year 2000. CPSC estimated that there were 8,500 injuries in 1999.
- The increase in injuries over 1999 was most likely related to increased fireworks sales for the Millennium celebrations. The fireworks industry reported a record year of sales. Also in many states, the period of time when fireworks could be sold was extended.
- The largest single increase in injuries was in January 2000, when there were 1,000 more injuries than in January 1999. In July 2000, there were 800 more injuries more than in July 1999.
- Estimated emergency department treated injuries for 2000 were significantly higher than during 1997-1999. But injuries were lower than 1992 through 1994, when the average was almost 12,500 injuries per year.
- An estimated 6,600 fireworks-related injuries were treated in U. S. hospital emergency departments during the one month special study period surrounding the Fourth of July, 2000 (June 23, 2000 July 23, 2000). These were 900 more injuries than the 1999 estimate of 5,700 for the same period. Highlights of the special study were as follows:

Firecrackers were associated with the greatest number of injuries at 1,600, followed by rockets at 1,300, and sparklers at 1,200.

About twice as many males were injured as females. This is consistent with the data for many years.

Injuries to children were a major component of total fireworks-related injuries with children under 15 accounting for almost half the injuries.

About 30 percent of injuries to children under age 15 involved firecrackers. Rockets accounted for about 15 percent of the injuries in this age group and sparklers accounted for about 20 percent of the injuries.

The parts of the body most often injured were the eyes (estimated 2,000 emergency department visits), hands (1,900), and the head/face body region (1,100).

Over half the injuries involved burns. Burns were the most frequent injury to all parts of the body except the eyes, where contusions, lacerations, and foreign bodies were the most frequent types of injuries.

A review of NEISS in-depth investigations of injuries during the special study period, showed that serious injuries were associated with (1) fireworks explosions that were earlier or later than expected by the user, (2) rockets with errant flight paths or (3) inappropriate use of fireworks by children.

- During 2000, CPSC's Office of Compliance and U. S. Customs Service surveillance ran at a high level due to the volume of fireworks entering the country for the Millennium and July 4<sup>th</sup> holiday celebrations. About 400 shipments that were suspected to be in violation of CPSC's regulations were sampled. We found about one-third of these shipments representing more than 7 million units were in violation of fireworks regulations.
- CPSC also initiated and participated in several multi-state criminal investigations. These investigations led to execution of several search warrants and indictment of at least three people. Also these investigations led to seizure of tens of thousands of illegal firecracker-type explosives and tons of illegally diverted professional fireworks. As a result of these investigations, several criminal defendants will be prosecuted during 2001.

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#### Introduction

This report describes injuries and deaths associated with fireworks during 2000. The report also describes CPSC enforcement activities for 2000.

Fireworks deaths were obtained from the CPSC Injury or Potential Injury Incident file (IPII). Data for the IPII file come from news clips, consumer complaints and reports from government agencies. Because reporting is voluntary, there may have been fireworks deaths that were not reported to any of these sources, and are not included among the deaths in this report. As a result, the number of deaths from fireworks-related injuries might be greater than reported here.

Emergency department treated injuries for fireworks in 2000 were obtained from CPSC's National Electronic Injury Surveillance System (NEISS). NEISS is a probability sample of U. S. hospitals with emergency departments. All estimates for the number of injuries in this report were obtained using the hospital totals and the sampling weights in NEISS. These estimates reflect emergency department treated injuries for the entire country.

The detailed analysis of injuries in hospital emergency departments in this report is based on a special study of fireworks injuries treated between June 23, 2000 and July 23, 2000. This special study focused on the types of fireworks involved in these injuries. Victims were shown illustrations of fireworks at emergency departments to help them identify the device associated with the injury. The type of fireworks device was not usually recorded during the rest of the year.

Also, during the special study period, CPSC initiated in-depth investigations of 69 fireworks injuries from the injuries treated at NEISS hospitals. These in-depth investigations focussed on injuries involving amputations, eye injuries, or injuries requiring hospital admissions. In almost all investigations, victims were telephoned and read a questionnaire. These investigations were intended to determine how the most serious injuries occurred, the medical treatment involved and the long-term consequences of the injuries. Victims were also asked where the device was obtained.

In this report, injury estimates derived from NEISS are rounded to the nearest 100 injuries and percentages are rounded to the nearest 5 percent. Estimates of less than 50 injuries are shown with an asterisk (\*). Totals may not add due to rounding.

Although a number of different analyses are provided in this report for different categories of injuries, including the age distribution of victims and the types of fireworks involved in the injury, interpretation of these estimates should be made with caution. This is because estimates based on small sample sizes have relatively large amounts of

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<sup>&</sup>lt;sup>1</sup> For a description of NEISS, including the revised sampling frame, see Kessler and Schroeder (1998). Procedures used for variance and confidence interval calculations, and adjustments for the sampling frame change in 1997 are found in Marker, Lo, Brick, and Davis (1999). SAS statistical software for trend and confidence intervals is documented in Schroeder (2000).

sampling variability. For example, when comparing subsets of the data, say between injuries associated with two different types of fireworks, or between two different years, it is difficult to determine how much of the difference between estimates is associated with sampling variability and how much comes from real differences in national injury totals.

## **Death and Injury Estimates**

#### Fireworks-related Deaths for 2000

CPSC has reports of 10 non-work related deaths that occurred from fireworks during 2000. This compares with 17 deaths that occurred from fireworks during 1999.<sup>2</sup> Brief descriptions of the 2000 incidents are as follows:

- A 25 year old man was killed in Hawaii on New Year's Day. A mortar shell exploded in the tube, striking the victim in the back of the head.
- In a second incident in Hawaii, an 80 year old woman was killed in December in a house fire that started in newspapers stored in her carport. It was reported that fireworks ignited the newspapers.
- Two girls, 11 months old and 4 years old, and a 2 year old boy in Ohio, were killed in a house fire in late June. The fire was started by a 17 year old male who threw a bottle rocket into the house.
- An Illinois man age 43 was killed on July 2 when an aerial firework he launched struck him in the head. Bystanders reported that he leaned over the firing tube to look at a shell that did not launch when expected.
- In a similar incident in Suffolk County, New York on July 4th, a 34 year old man lit a fuse, then looked in the tube when the aerial bomb did not go off. He was struck in the head when it went off.
- Also on July 4<sup>th</sup>, some occupants of a sports utility vehicle in Iowa were throwing firecrackers out of the windows, according to the police. One of the firecrackers blew back into the vehicle igniting other fireworks. Witnesses said that the windows were blown out causing a fire and a crash. A female teenager was killed.
- A 34 year old Michigan man was lighting a display type firework at a party on July 8. The device had 36 tubes. According to witnesses, the first shell discharged while the

<sup>&</sup>lt;sup>2</sup> See Greene MA and Race PM (2000), "1999 Fireworks Annual Report: Fireworks-Related Deaths, Emergency Department Treated Injuries, and Enforcement Activities During 1999," US Consumer Product Safety Commission, Washington, DC. One additional fireworks death was reported in CPSC's death certificate file since that report was completed. This was the death of a 63 year old Indiana female on July 4, from shrapnel from an explosive cannon. This incident occurred at her summer home.

man was bent over lighting the last of the fireworks. He was struck in the head and died three days later.

• A 6 year old Arkansas female placed a lit bottle rocket in her mouth on June 28. The rocket exploded causing damage to her esophagus. She died 43 days later from multi-system organ failure due to the esophageal injury.

According to the National Fire Protection Association (Hall, 2001), US death certificates show an average of 6.5 deaths per year from fireworks incidents between 1980 and 1997.

## National Injury Estimates for 2000 and Comparison with Prior Years

Table 1 and Figure 1 present the estimated number of fireworks-related injuries for 1988 through 2000 that were treated in U. S. hospital emergency departments annually.

Table 1 Estimated Fireworks-Related Injuries 1988-1999

Year	Estimated Injuries
2000	11,000
1999	8,500
1998	8,500
1997	8,300
1996	7,300
1995	10,900
1994	12,500
1993	12,000
1992	12,500
1991	10,900
1990	12,000
1989	9,600
1988	10,100

Source: NEISS, U. S. Consumer Product Safety Commission/EPHA. Estimates for 1988-1996 were revised to adjust for the new sampling frame and do not match values published in reports for 1997 or earlier. Injury estimates rounded to nearest 100 injuries. Cases were weighted by the NEISS sampling weights.

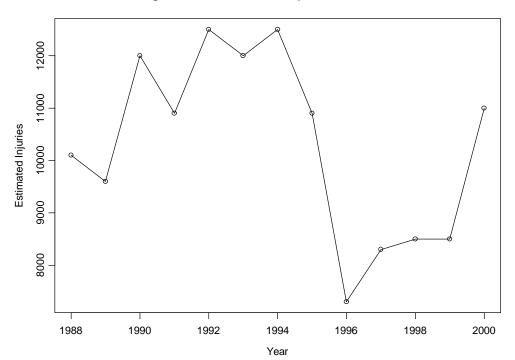


Figure 1. Fireworks Injuries 1988-2000

In 2000, there were an estimated 11,000 fireworks injuries for the calendar year.<sup>3</sup> This was 2,500 more injuries than were reported for 1999 and 1998 (Greene and Race 2000, Greene 1999).

Some of the increase in injuries was most likely due to the increased fireworks activities associated with Millennium celebrations. Monthly comparisons of 1999 and 2000 fireworks injuries are shown in Table 2 below.

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 $<sup>^3</sup>$  95 percent confidence interval 8,300-13,900. The estimate for 2000 is (statistically) significantly greater than the estimate for 1999 (z=1.97, p=0.0487). The 2000 estimate was based on a sample of 306 emergency department visits.

Table 2 Comparison of 2000 Fireworks Injuries with 1999 Injuries by Month

11,000	2,500
11,000	2 500
	2,300
1,400	1,000
*	*
100	*
200	200
100	*
1,000	200
6,900	800
400	200
300	200
200	100
100	*
	-100
	200 100 1,000 6,900 400 300 200

Source: NEISS, U. S. Consumer Product Safety Commission/EPHA. See Table 1. Estimates less than 50 are shown as \*.

The largest increase in injuries occurred in January of 2000, which had 1,000 more injuries than January 1999. In typical years, there were few injuries in January. Another 800 more injuries occurred in July, followed by 200 more each in April, June and August and September.

## **Injury Estimates for the 2000 Special Study**

The remainder of the injury analysis in this report presents the results of the 2000 special study of hospital emergency department treated fireworks injuries that occurred between June 23 and July 23, 2000. During this period, there were an estimated 6,600 fireworks-related injuries for the special study period.<sup>4</sup>

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<sup>&</sup>lt;sup>4</sup> 95 percent confidence interval 4,400-8,800: Based on 183 emergency department visits. As in previous Fireworks Annual Reports, these cases include only cases where the fireworks device exploded. There were 17 emergency department visits (estimated 700 injuries), during the special study period that did not involve explosions.

# Fireworks Types and Injury Dispositions

Table 3 shows the number of injuries by fireworks type.

Table 3
Estimated Fireworks-Related Injuries
By Type of Firework
June 23-July 23, 2000

Fireworks Type	Estimated Injuries			
Total	6 600			
Total	6,600			
Firecrackers	1,600			
Small	600			
Illegal	200			
Unspecified Firecrackers	700			
Rockets	1,300			
Bottle Rockets	900			
Other, Unspecified	400			
Other Consumer Devices	2,200			
Sparklers	1,200			
Fountains	100			
Novelties	200			
Multiple Tube and Shell	100			
Reloadable Shells	300			
Roman Candles	400			
Homemade/Altered	100			
Public Display	200			
Unspecified Fireworks	1,200			

Source: NEISS, U. S. Consumer Product Safety Commission/EPHA. Based on 183 reported emergency department visits between June 23, 2000 and July 23, 2000. See notes for table 1. Totals may not add due to rounding. Estimates rounded to nearest 100 injuries.

As shown in Table 3, firecrackers accounted for about 25 percent (1,600) of all injuries that occurred during this period. Among firecrackers, illegal, large firecrackers, such as M-80's were involved in 200 estimated injuries. This was less than 5 percent of the total injuries. Among legal consumer devices, rockets (1,300 injuries) and sparklers (1,200 injuries) were major contributors. Bottle rockets accounted for 900 of the 1,300 rocket-related injuries.

Although most of these fireworks-related injuries were treated at emergency departments and then released, an estimated 10 percent (700 cases) required hospital admission or transfer to another hospital for treatment. This was somewhat higher than the hospitalization and treat/transfer rate of 4.5 percent for all consumer product related injuries.

## Age and Sex of Injured Persons

Children under 5 experienced almost 15 percent (900 injuries) of all fireworks-related injuries as shown in Table 4. Children in the 5 to 14 age group accounted for about 35 percent (estimated 2,300) of the fireworks-related injuries. Together, children under 15 accounted for almost half the fireworks injuries.

The age group 15 to 24 had about 20 percent of the injuries (1,300) and the 25 to 44 age group had almost 25 percent of the injuries (1,500). People over 45 experienced less than 10 percent of the injuries.

The injury rates per 100,000 population were highest among children aged 10 to 14 with 7.7 injuries per 100,000 people. Children between 5 and 14 years of age had 5.8 injuries per 100,000 people, followed by children under 5 with 4.9 injuries per 100,000 people. Young adults 15 to 19 had 4.1 injuries per 100,000 people.

In general, most injuries were to males, accounting for 4,500 incidents. About twice as many males were injured as females.

Table 4
Estimated Fireworks-Related Injuries
By Age and Sex
June 23-July 23, 2000

_	Group ars)		Total	Male	Female	Injuries per 100,000 people
Total			6,600	4,500	2,100	2.4
Less	Than	5	900	600	300	4.9
5	То	14	2,300	1,800	500	5.8
5	To	9	800	600	200	3.9
10	To	14	1,500	1,200	300	7.7
15	To	24	1,300	700	600	3.5
15	To	19	800	500	300	4.1
20	То	24	500	200	300	2.8
25	То	44	1,500	1,100	500	1.9
45	To	64	400	200	200	0.6
65 -	F		200	100	100	0.4

Source: NEISS, U. S. Consumer Product Safety Commission/EPHA. Notes: See Table 3. US population from www.census.gov/population/estimates/nation/intfile2-1.txt

# Age of the Injured Person by Type of Fireworks

Table 5 presents the ages of those injured by the type of fireworks device involved in the injury. Injuries to the youngest children, under 5, were associated primarily with sparklers and firecrackers. For 5-14 year olds and for 15-24 year olds, firecrackers, other devices (including sparklers) and rockets were the source of injuries.

Table 5
Estimates Fireworks-Related Injuries
By Device Type and Age Group
June 23-July 23, 2000

			Age	Group (Y	ears)		
Fireworks Type	Totals	<5	5-14	15-24	25-44	45-64	65+
Total	6,600	900	2,300	1,300	1,500	400	200
Firecrackers	1,600	300	700	300	300	*	*
Small	600	100	300	*	200	*	*
Illegal	200	*	*	100	100	*	*
Unspec	cified 700	200	400	200	*	*	*
Rockets	1,300	100	400	400	400	100	*
Bottle	900	*	300	200	400	*	*
Other	400	100	100	200	*	100	*
Other Devices	2,200	500	700	300	600	100	200
Sparkle	ers 1,200	400	300	100	400	*	100
Variou	s 1,000	100	400	200	200	100	100
Homemade/Alte	red 100	*	*	*	*	*	*
Public Display	200	100	100	100	*	*	*
Unspecified	1,200	*	400	300	300	200	*

Source: NEISS, U. S. Consumer Product Safety Commission/EPHA. Notes: See Table 3. Other Devices: Various include fountains, novelties, multiple tube and shells, reloadable shells and Roman candles.

## Injury Diagnosis and Body Part Injured

Table 6 presents the types of injuries sustained to specific parts of the body. Seventy-five percent of injuries (5,000) were to the hands, head/face, and eyes. Hands and fingers with an estimated 1,900 injuries, accounted for 30 percent of the total injuries. With 1,100 total injuries, head and face injuries were about 20 percent of the total.

Among diagnoses, burns with 3,600 estimated injuries and 55 percent of the total, were the most frequent. Contusions and lacerations, at 1,700 injuries and 25 percent of the total were the second most frequent. Contusions, lacerations, and foreign bodies (the last counted in other diagnoses) were the most common eye injuries. Head and facial injuries involved slightly more burns than contusions or lacerations.

Table 6
Estimated Fireworks-Related Injuries
By Body Part and Diagnosis
June 23-July 23, 2000

Body Part	Total	Burns	Contusions Lacerations	Fractures Sprains	Other Diagnoses
Total	6,600	3,600	1,700	100	1,200
Arm	500	300	200	*	*
Eye	2,000	400	900	*	700
Hand/Finger	1,900	1,600	100	100	200
Head/Face/Ear	1,100	500	400	*	200
Leg	800	700	*	*	100
Trunk	300	100	100	*	*

Source: NEISS, U. S. Consumer Product Safety Commission/EPHA. Notes: See Table 3. Fractures and sprains also included dislocations. Other diagnoses included all other injury categories. The arm category includes lower arm, elbow, upper arm, shoulder, and wrist. Head/Face/Ear injuries include the NEISS codes for face, eyelid, eye area and nose, head, neck, mouth, lips, tongue, teeth and ear. The category for legs includes codes for upper leg, knee, lower leg, and ankle, foot and toe. Trunk includes NEISS codes for lower trunk, upper trunk (not including shoulders), and pubic region, multiple body parts, internal and other.

## Type of Fireworks and Body Part Injured

Table 7 below presents estimated injuries by the fireworks device and body part involved. Firecracker injuries occurred most frequently to the hand (700 injuries). Typically, victims sustained injuries from firecrackers while holding the device, or attempting to release it after ignition. Rockets were represented in injuries to the eye, and head/face region. Victims sustained injuries from erratic rocket flight patterns, or burning debris from the rocket. Sparkler injuries typically involved the hands or sparks getting into the eyes.

Table 7
Estimated Fireworks-Related Injuries
By Type of Firework and Body Part Injured
June 23-July 23, 2000

Type of				Hands	Head		
Fireworks	Total	Arm	Eye	Fingers	Face/Ear	Leg	Trunk
Total	6,600	500	2,000	1,900	1,100	800	300
Firecrackers	1,600	*	400	700	200	200	*
Rockets	1,300	200	500	100	400	*	100
Sparklers	1,200	100	300	500	200	200	*
Other Devices	1,000	200	200	200	100	200	*
Homemade/Altered	100	*	*	100	*	*	*
Public Display	200	*	200	*	*	*	*
Unspecified	1,200	*	400	300	300	100	100

Source: NEISS, U. S. Consumer Product Safety Commission/EPHA. Notes: See Table 3. Fireworks types are defined in Table 3, and body parts are defined in table 6.

#### **In-depth Investigations of Fireworks Injuries**

CPSC conducted in-depth investigations of the more serious injuries associated with fireworks that occurred during the month surrounding the July 4 holiday. Summaries of the investigations are found in the Appendix to this report. Injuries were selected when they involved the eye, amputations, or when the victim was either admitted to the hospital or transferred to another facility for treatment. These injuries were selected to develop information on potential long-term health effects of the injury, and how the incident occurred. Investigations were also conducted when the injury was suspected to result from the use of illegal fireworks.

Most of the investigations were conducted by telephone. Either the victim was the source of information or the victim's guardian, when the victim was under 18.

There were 40 completed investigations and 29 other cases that were selected but could not be completed. The main reasons for the incomplete investigations were that the victim could not be contacted or refused to cooperate.

Eye injury cases often involved rockets such as Roman candles, bottle rockets or shells. Typical causes were errant flight paths (see Task Number 000713HEP9014 in the Appendix), or debris from the explosion entering the victim's eye (000714HEP9018). In

most cases, the victim expected full recovery (000713HEP9007, 000713HEP9013), but there were other cases where this was uncertain (000724HEP9015).

Some of the most serious injuries were associated with large firecrackers and homemade devices that probably had a large amount of explosives. For example, an apparently early explosion of an M150 firecracker caused a fracture and finger amputation for a 19 year old male (000724HEP9020). Also, an M80 firecracker caused a hand fracture and lacerations (000724HEP9024).

Homemade devices also caused serious injuries. A 17 year old male received hand burns and fractures with an M200 cherry bomb that exploded when he thought the fuse was not lit (000724HEP9021). In two separate incidents, hand amputations resulted from homemade sparkler bombs that exploded before the victim could throw them (000724HEP9026, 000804HEP9002). Early explosions of a home-made device also resulted in facial and eye injuries for a 26 year old male (000810HEP9002) and fracture of several fingers of a 19 year old male (000804HEP9001).

Finally, there were serious injuries associated with misuse of fireworks devices. A 5 year old male was injured by a firework thrown into a crowd during a public display (000718HEP9009). Glass particles entered the eye of a 14 year old victim who heated a bottle containing powder from a firecracker (000724HEP9014). Another victim suffered a fractured thumb and hand injury when a firecracker he had buried then exploded (000725HEP9011).

#### **Enforcement Activities**

CPSC's Office of Compliance took a multifaceted approach in its enforcement activities regarding fireworks in 2000. A variety of enforcement techniques and initiatives were utilized to keep dangerous and unsafe fireworks from consumers. In part this was to respond to the unique enforcement challenges that the year 2000 and the Millennium celebrations presented. The fireworks industry reported a record year of sales and in many states and localities, the period of time for fireworks sales was extended. CPSC responded to the increased activities by investigating and taking action against all types of illegal or banned fireworks being sold or distributed.

As part of this approach, the CPSC continued its work with the U.S. Customs Service to conduct surveillance on imported shipments of fireworks to ensure that those shipments meet CPSC's regulations. Surveillance operations ran at a high level due to the volume of fireworks entering the country in connection with the Millennium and July 4<sup>th</sup> holidays. From the thousands of fireworks shipments entering the U. S., CPSC and Customs sampled approximately 400 shipments, to determine if they complied with regulations. Shipments were selected based on past violation history, the category of fireworks type, and whether they were items that had not been sampled previously. About one-third of the shipments were found to contain fireworks that violated CPSC fireworks regulations. These shipments accounted for more than 7 million units

presenting violations serious enough to warrant seizure or other actions by the U.S. Customs Service.

Another enforcement activity that CPSC assigned priority was investigations into firms and individuals who offer "kits" and components used to make illegal and dangerous firecracker type explosives such as "M-80's" and "Quartersticks." The CPSC initiated several investigations. Several firms and individuals conducted sales over the internet. In one case, a chemical company was placed under permanent injunction and agreed to stop selling several precursor chemicals all together.

CPSC also initiated and participated in several multi-state criminal investigations. These investigations led to several search warrants during 2000 and the indictment of at least three individuals. CPSC worked cooperatively with other Federal agencies such as the Bureau of Alcohol, Tobacco & Firearms and state and local law enforcement agencies in these cases. CPSC provided legal, field and technical support in several cases involving the large-scale distribution of illegal explosive devices and illegal diversion of professional display fireworks to consumers. These criminal investigations led to the seizure of tens of thousands of illegal firecracker-type explosive devices and tons of illegally diverted professional fireworks. Several of the individuals who were the subjects of these investigations will be prosecuted in 2001.

#### Discussion

The total number of estimated fireworks injuries for 2000 was 2,500 injuries more than 1999 and 1998 at 11,000. It is believed that the increase was due to increased fireworks activities associated with the Millennium celebrations. About 40 percent of the increase (1,000 injuries) occurred in January, 2000. The remaining increases were found in July (800 more injuries), and April, June, August and September (200 additional injuries in each month).

During the one-month special study period of June 23 to July 23, there were 6,600 injuries, not much more than the 1999 total of 5,700. The age and gender distribution of victims was similar to 1999. Children aged 10-14 were at highest risk of injury, followed by children under 5 and children between 15 and 19. Males were twice as likely to be victims of fireworks injuries as females. Firecrackers caused the most injuries, followed by sparklers and bottle rockets.

A review of in-depth investigations of serious fireworks injuries showed that typical causes of injuries included (1) fireworks exploding earlier or later than expected by the user, (2) rockets with errant flight paths and (3) inappropriate use.

Enforcement activities were increased during 2000 to respond to increased sales from the Millennium and July 4<sup>th</sup> celebrations. CPSC's Office of Compliance worked with U.S. Customs to sample imported fireworks and seize illegal shipments. CPSC also initiated investigations of firms and individuals who offered kits and components to make illegal and dangerous firecrackers. Several of these sales involved use of the internet.

Also during 2000, CPSC provided legal, field and technical support in cases involving large-scale distribution of illegal explosive devices and illegal diversion of professional display fireworks to consumers. These investigations have led to seizures of tons of fireworks and will lead to prosecution of several individuals.

**Appendix** Completed In-Depth Investigations

Task Number	Age	Sex	Treatment Date	t Disposition	Diagnosis	Body Part	Type of Fireworks	Apparent Cause	Medical Treatment and Prognosis
000712HEP7812	7	Male	7/2/00	Treat and Release	Burns, Thermal	Upper Leg	Firecracker	Victim had firecrackers in his pockets. Put a hot stick in his pockets causing explosion.	Salve burn cream. Full recovery expected.
000713HEP9001	16	Female	7/5/00	Treat and Release	Laceration, Abrasion	Laceration of the face and corneal abrasion	Unknown	Hit in eye by firework	Stitches for laceration. Full recovery.
000713HEP9007	13	Male	7/1/00	Treat and Release	Abrasion	Cornea	Bottle Rocket or Roman Candle	Hot debris	Full recovery expected.
000713HEP9008	14	Female	7/4/00	Treat and Release	Hemorrhage	Eye and Eyelid	Bottle Rocket	Struck by bottle rocket	Full recovery expected.
000713HEP9009	13	Male	7/4/00	Treat and Release	Abrasion	Cornea	Bottle Rocket	Struck by bottle rocket	Blurred vision experienced. Full recovery expected
000713HEP9010	14	Male	7/4/00	Treat and Release	Burns	Eye	Firecracker	Firecracker exploded before victim expected.	
000713HEP9013	43	Male	7/4/00	Treat and Release	Laceration	Eye	Bottle Rocket	Delayed explosion	Full recovery expected.
000713HEP9014	43	Male	7/5/00	Treat and Release	Laceration	Eye and Eyelid	Bottle Rocket	Bad flight path	Stitches to eyelid. Surgery possible in future. Full recovery uncertain.
000713HEP9015	26	Male	7/5/00	Treat and Release	Burns, Thermal	Face	Roman Candle	Bad flight path	Full recovery expected.
000713HEP9018	12	Male	7/5/00	Treat and Release	Abrasion	Cornea	Roman Candle	Bad flight path	Full recovery expected

000713HEP9019	6	Male	6/28/00	Treat and Release	Conjunctivitis	Eye	Rocket	Victim blew on rocket after it was extinguished getting ash in his eye	Full recovery expected.
000713HEP9020	34	Male	7/10/00	Treat and Release	Conjunctivitis	Eye	Unknown	Exposure to fireworks smoke	Eye drops. Full recovery
000714HEP9001	4	Male	7/3/00	Treat and Release	Abrasion	Eye	Firecracker	Struck by firecracker fragment or dirt	Fully recovered.
000714HEP9002	11	Male	7/1/00	Treat and Release	Burns	Eye	Public Display	Burning ember in eye	NA
000714HEP9003	19	Female	7/5/00	Treat and Release	Conjunctivitis	Eye	Firecracker	Splashed by gunpowder from exploding firework	Blurred vision experienced.
000714HEP9010	40	Male	7/4/00	Transfer	Burns	Face, Legs and Arms	Sparklers and fireworks	Victim burned when 4 year old girl dropped a sparkler on a box of fireworks that caused the fireworks to explode	2nd degree burns. Treatment continues. Recovery expected in 1-2 years
000714HEP9011	14	Male	7/4/00	Treat and Release	Dermatitis/Conjuncti	Eye	Sparkler	Spark entered victim's eye	
000714HEP9012	15 mo	Male	7/4/00	Treat and Release	Burns	Eye	NA	Hot round object entered victim's eye during public fireworks display	Full recovery
000714HEP9013	16	Female	7/4/00	Treat and Release	Burns	Eye	Fireworks	Victim injured when fireworks box exploded after ignition by a stray spark from a lighter	NA
000714HEP9018	36	Male	7/3/00	Treat and Release	Foreign Body	Eye	Bottle Rocket	Debris from fireworks in victim's eye	Full recovery.
000718HEP9003	7	Female	7/3/00	Treat and Release	Other	Corneal abrasion of the eye.	None	Victim was passing a punk used to light fireworks, that she poked in her eye.	Full Recovery
000718HEP9008	19	Female	7/5/00	Treat and Release	Contusions, Abr.	Corneal abrasion.	Bottle Rocket	Device backfired.	Ointment for eye. Abrasion expected to gradually heal.

000718HEP9009	5	Male	7/5/00	Treat and Release	Burns, Thermal	Eye and Cheek	Cherry Bomb?	Firework thrown into crowd during public display	Full recovery expected.
000718HEP9010	29	Male	7/4/00	Treat and Release	Burns, Thermal	Laceration to forehead, face and eyes	Mortar	Delayed explosion	Stitches to forehead, eyes flushed. Full recovery uncertain. Victim cannot see out of left eye completely.
000721HEP7681	11	Male	7/5/00	Treat and Release	Burns	Upper Leg	Firecracker	Firecracker flew up the leg of victim's shorts	Full recovery expected.
000724HEP9001	36	Male	7/2/00	Treat and Release	Foreign Body	Eye	Single tube shell	Fuse came off and went into victim's eye	Full recovery expected.
000724HEP9014	14	Male	7/13/00	Admit	Other	Glass Particles in eye, lacerations to chest	Large Firecracker	Victim removed powder from a firecracker, put in a bottle, then heated the bottle causing an explosion.	Surgery to remove glass from eye. Full recovery expected
000724HEP9015	13	Male	7/7/00	Treat and Release	Contusions, Abrasions	Eye	Bottle Rocket	Struck by firework in the right eye	Permanent damage to cornea and lens. Full return of vision uncertain.
000724HEP9020	19	Male	7/4/00	Admit	Fracture, Amputation	Hand and Fingers	M150	Early explosion	Surgery, cast, therapy and further surgery expected. Time to full recovery uncertain.
000724HEP9021	17	Male	7/4/00	Admit	Chemical Burns And Fractures	Hand	M200 Cherry bomb. Home made	Victim thought fuse was not lit	Fingers and hand bones fractured, reconstructive surgery and cast. Undergoing hand therapy, full recovery expected.
000724HEP9023	26	Male	7/5/00	Admit	Laceration	Neck	Uncertain if firework	Either firework or bullet dislodged a rock from a wall, which penetrated victim's neck.	Full recovery expected.
000724HEP9024	53	Male	7/3/00	Admit	Fractures And Lacerations	Hand	M80s	Early explosion/short fuse	Surgery. Victim may have limited mobility of 2 fingers

000724НЕР9026	22	Male	7/5/00	Admit	Amputation Of The Right Hand	Hand, Ear drum	Home-made sparkler bomb (100 sparklers)	Device exploded before victim could throw it.	Amputation of right hand, physical therapy for arm, awaiting prosthetic hand.
000725HEP9005	13	Male	7/12/00	Treat and Release	Contusions, Abr.	Corneal abrasion of the eye.	Bottle Rocket	Unknown. Victim did not fully participate in the study.	Full Recovery
000725HEP9011	42	Male	7/16/00	Admit	Fracture	Fractured Thumb and Hand Injury	Large Firecracker (M 100), over 1.5"	Buried firework exploded	Full Recovery
000726НЕР9002	6	Female	7/21/00	Treat and Release	Burns, Thermal	Corneal Burn	Sparkler	Sparks from twirling sparkler	Eye flushed. Full recovery expected.
000727HEP9001	28	Female	7/2/00	Treat and Release	Conjunctivitis	Eyeball	Public Display	Ember from a falling firework	Eye flushed. Full recovery expected.
000804HEP9001	19	Male	7/20/00	Admit	Fracture	Several Fingers	Homemade	Victim picked up a homemade firework from the ground that exploded	Full recovery expected followin physical therapy.
000804HEP9002	56	Male	7/18/00	Admit	Amputation	3 Fingers	Sparkler Bomb	Device blew up in victim's hand	Loss of fingers
000810HEP9002	26	Male	7/15/00	Treat and Release	Burn, Not Spec.	Eye, forehead, cheeks	Home-made	Explosion too early	Eye and face bandaged. Vision blurred in right eye. Full recovery uncertain.

# In-Depth Investigations that could not be completed

Task Number	Age	Sex	Treatment Date	Disposition	Diagnosis	Body Part
000705HEP0161	11	Male	7/1/00	Treat and Release	Burns, Thermal	Upper Leg
000713HEP9005	22	Female	7/4/00	Treat and Release	Burns, Thermal	Eyeball
000713HEP9006	12	Female	6/30/00	Treat and Release	Laceration	Eyeball
000713HEP9011	4	Female	7/4/00	Treat and Release	Derma/Conjunct	Eyeball
000713HEP9012	13	Female	6/25/00	Treat and Release	Contusions, Abr.	Eyeball
000714HEP7812	8	Female	7/5/00	Treat and Release	Burns, Thermal	Upper Arm
000714HEP9004	7	Male	7/4/00	Treat and Release	Contusions, Abr.	Eyeball
000714HEP9005	23	Female	7/5/00	Treat and Release	Contusions, Abr.	Eyeball
000714HEP9006	67	Male	6/25/00	Treat and Release	Contusions, Abrasion	Eye
000714HEP9007	15	Male	7/3/00	Treat and Release	Other	Eyeball
000714HEP9008	9	Male	7/5/00	Treat and Release	Other	Eyeball
000714HEP9009	4	Female	7/4/00	Transfer	Burns, Thermal	Knee
000714HEP9014	4	Female	7/4/00	Transfer	Burns, Thermal	Hand
000714HEP9015	42	Female	7/4/00	Transfer	Burns, Thermal	Hand
000714HEP9016	8	Male	7/2/00	Treat and Release	Contusions, Abr.	Eyeball
000714HEP9017	20	Male	7/5/00	Treat and Release	Contusions, Abr.	Eyeball
000714HEP9019	29	Male	6/26/00	Treat and Release	Foreign Body	Eyeball
000717HEP9001	22	Female	7/5/00	Treat and Release	Contusions, Abr.	Eyeball
000718HEP9001	33	Male	7/4/00	Admit	Fracture	Finger
000718HEP9002	17	Male	7/4/00	Transfer	Foreign Body	Eyeball
000718HEP9004	4	Female	7/5/00	Treat and Release	Burns, Thermal	Face
000718HEP9005	11	Male	7/7/00	Admit	Laceration	Eyeball

000719HEP9005	38	Male	7/10/00	Treat and Release	Contusions, Abr.	Eyeball
000724HEP9022	13	Male	7/2/00	Admit	Other	Hand
000724HEP9025	14	Male	7/3/00	Treat and Release	Contusions, Abr.	Eyeball
000725HEP9009	43	Female	7/4/00	Treat and Release	Burns, Thermal	Eyeball
000803HEP9003	11	Male	7/11/00	Admit	Burns, Thermal	Finger
000815HEP9002	32	Male	7/4/00	Treat and Release	Contusions, Abr.	Eye And Face
000818HEP9001	12	Male	7/4/00	Admit	Burns, Thermal	Lower Trunk

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