



2007 Fireworks Annual Report

Fireworks-Related Deaths, Emergency Department-Treated Injuries, and Enforcement Activities During 2007

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This report was prepared by the CPSC staff, has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

Executive Summary

This report provides the results of the U. S. Consumer Product Safety Commission (CPSC) staff analysis of data on non-occupational fireworks-related deaths and injuries during 2007. The report also includes a summary of CPSC staff enforcement activities during 2007.

Staff obtained information on fireworks-related deaths from news clippings and other sources in CPSC's Injury and Potential Injury Incident (IPII) database. Staff estimated fireworks-related injuries from CPSC's National Electronic Injury Surveillance System (NEISS). More detailed analyses of injuries including the type of injury and the firework involved, and the characteristics of the victim were based on a special study conducted by CPSC staff between June 22 and July 22, 2007. About two-thirds of the annual fireworks-related injuries for 2007 occurred during that period.

Highlights of the report are as follows:

- CPSC staff has reports of 11 fireworks-related deaths during 2007. Five people were killed in incidents involving aerial and display fireworks. Three people died in fires where fireworks were the ignition source. Three people were killed as a result of manufacturing or storing illegal fireworks. CPSC staff has reports of 11 fireworks-related deaths in 2006.
- Fireworks were involved in an estimated 9,800 injuries treated in U. S. hospital emergency departments during calendar year 2007 (95 percent confidence interval 7,700 – 11,800). CPSC staff estimated that there were 9,200 fireworks-related injuries during 2006.
- An estimated 6,300 fireworks-related injuries (or 64 percent of the total fireworks-related injuries) were treated in U.S. hospital emergency departments during the one-month special study period between June 22, 2007 and July 22, 2007 (95 percent confidence interval 4,500 – 8,100). CPSC staff estimated that there were 6,400 fireworks-related injuries (70 percent of the total) during the 2006 special study period.
- Emergency department-treated fireworks-related injuries display a statistically significant upward trend from 1996 to 2007.

Results from the special study include the following:

- Of the injuries sustained, 70 percent were to males and 30 percent were to females.
- Injuries to children were a major component of total fireworks-related injuries with children under 15 accounting for 42 percent of the estimated injuries. Children and young adults under 20 had 54 percent of the estimated injuries.

- Among different types of fireworks, sparklers were associated with the greatest number of estimated injuries at 1,100. There were 1,000 injuries associated with firecrackers and 900 associated with rockets.
- The parts of the body most often injured were hands (estimated 2,000 injuries), eyes (1,400 injuries) and legs (1,200 injuries).
- More than half of the injuries were burns. Burns were the most common injury to all parts of the body except the eyes and head area, where contusions, lacerations, and foreign bodies in the eye occurred more frequently.
- Most patients were treated at the emergency department and then released. An estimated 5 percent of patients were treated and transferred to another hospital or admitted to the hospital.

CPSC staff conducted telephone follow-up investigations of some fireworks-related injuries reported at NEISS hospital emergency departments during the special study period. Most cases were selected for follow-up because they involved potentially serious injuries and/or hospital admissions. Thirty-nine telephone interviews were completed.

A review of data from telephone follow-up investigations showed that the typical causes of injuries were as follows: (1) misuse of fireworks, (2) fireworks exploding earlier or later than expected, (3) errant flight paths, (4) sparks or debris from fireworks, and (5) other malfunctions. According to the investigations, most victims already had recovered from their injuries or were expected to recover completely, but several victims reported to telephone investigators that the injuries could result in long term effects.

During 2007, CPSC's Office of Compliance and Field Operations continued to work closely with other agencies to conduct surveillance on imported fireworks and to enforce the provisions of the Federal Hazardous Substances Act. Examples of these activities are as follows:

- With assistance from the Bureau of Customs and Border Protection, staff from CPSC selectively sampled and tested over 400 shipments of fireworks in fiscal year 2007 to determine if they were in compliance with the Federal Hazardous Substances Act. Of those, approximately 46 percent of shipments were found to contain fireworks that were noncompliant.
- CPSC staff, working with the Department of Justice, completed a number of cases against firms and individuals that offer kits and components to make illegal and dangerous firecracker-type explosives such as M-80s. These companies and individuals have been prohibited from selling chemicals and components. Staff also participated in several multi-state criminal investigations with the Bureau of Alcohol, Tobacco, Firearms and Explosives, the Department of Justice, and state

and local law enforcement agencies. Staff provided legal, field, and technical support in cases involving the distribution of illegal explosive devices and the illegal diversion of professional fireworks to consumers.

Reflecting the international global economy, CPSC has strengthened ties with its counterpart in China, the General Administration for Quality Supervision, Inspection and Quarantine (AQSIQ). The AQSIQ and the CPSC established four working groups focusing on consumer products, one of which was fireworks. According to recent statistics from the U. S. International Trade Commission, more than 97 percent of all fireworks imported into the United States are manufactured in China. The Work Plans for the working group were presented at the 2nd U.S.-Sino Safety Summit held in Washington, DC on September 11, 2007. Specifically, the Chinese government agreed to cooperate on product safety for fireworks and the other products through the following tasks:

- Exchange of information on standards
- Training on product testing
- Exchange of information on emerging hazards
- Increased inspection of high risk products, including fireworks
- Tighter controls on the quality of inputs from sub-suppliers.

CPSC's Office of Compliance and Field Operations and Office of International Programs and Intergovernmental Affairs took the lead on these projects.

1. Introduction

This report describes injuries and deaths associated with fireworks during 2007. The report also describes CPSC staff enforcement activities for 2007. Reports for earlier years in this series can be found on the internet at www.cpsc.gov/library/data.html.

This report is organized into seven sections. Section 1 contains a discussion of the data and statistical methods used in the staff analysis. Section 2 describes fireworks-related deaths. Section 3 provides a national annual estimate of fireworks-related emergency department-treated injuries for 2007 and compares that estimate with estimates for previous years. Section 4 analyzes emergency department-treated fireworks-related injuries. The analysis is based on a special study of emergency department-treated injuries that occurred during the month around July 4th. Section 5 summarizes the in-depth telephone investigations of fireworks-related injuries. Section 6 describes enforcement activities by CPSC's Office of Compliance and Field Operations. The main body of the report then concludes with a summary of the findings in Section 7. Appendix A presents a table on the relationship between fireworks-related injuries and estimated fireworks consumption between 1996 and 2007. Appendix B contains more detail on the completed telephone investigations.

Sources of Information

Information on non-work-related fireworks deaths occurring during 2007 was obtained from the CPSC Injury and Potential Injury Incident file (IPII) and CPSC's Death Certificate File. Entries in IPII come from sources such as newspaper articles, consumer complaints, referrals by lawyers, medical examiners, and other government agencies. Staff screened reports to eliminate duplicate reports of the same incident recorded in multiple sources. Then the CPSC field staff conducted in-depth investigations on these fireworks-related deaths. The purpose of these investigations was to determine the types of fireworks involved and the circumstances that led to the fatal injuries.

Because IPII is based on voluntary reports and because it can take more than two years to receive all death certificates from the various states to complete the Death Certificate File, neither data source can be considered complete for 2007 fireworks-related deaths at the time this report was prepared. As a result, the number of deaths for 2007 might have been greater than the number reported here. Staff updates the number of deaths for previous years when reports are received. Total deaths for previous years may not agree with numbers in reports for earlier years because of such updates.

The source of information on fireworks-related injuries is the National Electronic Injury Surveillance System (NEISS). NEISS is a probability sample of U.S. hospitals with emergency departments.¹ Injury information is taken from the emergency

¹ 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

department record. This information includes the victim's age and sex, where the injury occurred, the emergency department diagnosis, body part injured, and the consumer product(s) associated with the injury. The information is supplemented by a 160 character narrative that often contains a brief description of how the injury occurred.

To supplement the information available in the NEISS record, every year, during the month around July 4th, CPSC staff conducts a special study of fireworks-related injuries. In 2007, the special study period was from June 22, 2007 to July 22, 2007. Staff efforts focus on fireworks during this period because, in previous years, about two-thirds of the annual injuries occurred then.² During this period, hospital emergency department staff shows patients pictures of different types of fireworks in order to help them identify the type of fireworks device associated with their injuries. The type of fireworks involved in the incident is then written in the NEISS narrative.

After reading the case records, including the narrative description of the firework and the incident scenario, CPSC staff may then assign cases for telephone investigations. Most cases were selected because they involved the most serious injuries and/or hospital admissions. Serious injuries included eye injuries, finger and hand amputations, and head injuries. In most years, phone interviewers are able to collect information from between one-third and one-half of the cases assigned. Information on the final status of the telephone interviews is found in Section 5.

In the telephone investigations, information is requested directly from the victim or the victim's parent about the type of fireworks involved, where it was obtained, how the injury occurred, the medical treatment and prognosis. When the fireworks device reported is different from that reported in the NEISS emergency department record, the device reported in the telephone investigation is used.

As a result of this process, there are three different levels of information that may be available about a fireworks-related injury case. For the cases that occur before the July 4th special study period or after the special study period, the NEISS record is almost always the only information. Many NEISS records collected outside the special study period do not specify the type of fireworks involved in the incident. During the special study period, more information is available for analysis because the NEISS record usually contains the type of fireworks and additional details on the incident scenario. The most information is available for a subset of the special study cases where there are telephone investigations. These different levels of information about injuries correspond to different analyses in the report as follows:

- Estimated national annual fireworks-related injuries. This estimate is made using all NEISS cases for the entire year, where fireworks were specified as one of the consumer products involved. For cases outside the special study period, as noted

change in 1997 are found in Marker, Lo, Brick, and Davis (1999). SAS[®] statistical software for trend and confidence interval estimation is documented in Schroeder (2000). SAS[®] is a product of the SAS Institute, Inc., Cary, NC.

² For example, see Greene and Joholske (2007).

above, there is usually no information on the fireworks type and limited information on the incident scenario. Consequently, there is not enough information to determine the role played by the fireworks in the incident. This means that the annual injury estimate includes a small number of cases where the fireworks device was not lit or no attempt was made to light the device. Calculating the annual estimates without removing these cases makes the estimates comparable with previous years.³

- Detailed analyses of injury patterns. The tables in the report that describe fireworks type, body part injured, diagnosis, age and sex of injured people, and other such information are based on the special study period only. Fireworks types are taken from the telephone investigation or the NEISS comment field when there was no telephone investigation. When computing estimates for the special study period, staff removes cases where the fireworks device was not lit or no attempt was made to light the device.
- Information from the telephone investigations. Individual case injury descriptions and medical prognosis information from the telephone investigations are listed in Appendix B. These listings also exclude cases where the fireworks device was not lit or no attempt was made to light the device. These cases represent a sample of the most serious fireworks-related injuries.

Statistical Methods

Injuries reported by NEISS sample hospitals were multiplied by the NEISS probability-based sampling weights to develop an estimate of total U.S. emergency department-treated fireworks-related injuries for the year and for the special study month around July 4th. Confidence intervals were estimated and other statistics were calculated using computer programs that were written to take into account the sampling design.⁴ Estimated injuries are rounded to the nearest 100 injuries.

The report also contains a number of detailed tables about fireworks-related injuries during the special study period. National estimates in these tables were made using the sampling weights. To avoid cluttering the tables, we do not include confidence intervals with these tables. Because the estimates are based on subsets of the data, they have large relative sampling errors (i.e., larger coefficients of variation than the annual injury estimate or the special study month injury estimate). As a result, interpretation and comparison of these estimates should be made with caution. For example, when comparing subsets of the data, say between injuries associated with two different types of fireworks or between two different age groups, it is difficult to determine how much of

³ The only exception to the practice of including all the cases was in 2003 where 9 cases representing an estimated 150 emergency department-treated injuries were excluded from the annual injury estimates. These cases resulted from the nightclub fire in West Warwick, Rhode Island, that also caused 100 deaths. For details see Greene and Joholske (2004).

⁴ See Schroeder (2000).

the difference between estimates is associated with sampling variability and how much comes from real differences in national injury totals. Estimates in the tables are also rounded to the nearest 100 injuries. Estimates of fewer than 50 injuries are shown with an asterisk (*). Estimates may not sum exactly to totals as a result of rounding.

2. Fireworks-Related Deaths for 2007

CPSC has reports of 11 fireworks-related deaths that occurred during 2007. Brief descriptions of the incidents are as follows:

Five deaths involving aerial and display fireworks

- A 7-year-old Alabama male was killed by a 2-inch mortar shell. His father had set up the mortar launcher on a wooden table. His father lit the fuse and walked over to his son to watch the shell launch. Just before launch, the family dog, who was sitting under the table, moved against the table, causing the launcher to fall to one side. The mortar launched horizontally striking the victim in the chest.
- A 13-year-old Texas male and several other teenagers were shooting bottle rockets and artillery shells at each other. While running from one of the boys, the victim was struck in the back of the head by an artillery shell, which exploded on impact. He died approximately 45 hours after the incident.
- A 25-year-old Kansas man died from massive head trauma after being struck in the head by a 4-inch mortar shell (display firework) that he had lit at a family gathering. According to news reports, the firework was illegal for unlicensed operators.
- A 27-year-old Michigan woman was killed by a display type firework that she had purchased at a local party store. She lit the device but it initially failed to go off. She then leaned over the device, which then exploded resulting in fatal head injuries.
- A 29-year-old Illinois man died from massive head trauma after a 3-inch mortar shell exploded. The victim placed the shell in a PVC pipe. The shell exploded when the victim leaned over to look into the pipe.

Three deaths in fires where fireworks were the ignition source

- A 4-year-old Oregon male discovered some fireworks that his father had recently purchased in a bedroom closet. The boy went into the closet early in the morning and lit some of the fireworks. This resulted in a fire that spread quickly. Nobody was able to rescue the victim because of the heat.

- A 19-year-old Illinois college student died as a result of a prank where someone shot a Roman Candle firework under his door into his room. Fire broke out in the room, and the victim died from asphyxiation.
- A 62-year-old Nevada man had spent the evening lighting fireworks. After finishing the fireworks activity, the victim placed the used fireworks in a cardboard box and then put the box in his garage. The fireworks smoldered and ignited the box. The resulting fire spread to the garage. The victim was overcome by smoke when he entered the garage to put out the fire.

Three deaths from illegal manufacturing of fireworks

- A 31-year-old man and his 32-year-old brother were involved in an explosion in a maintenance building in an apartment complex in Michigan. The victims were manufacturing fireworks when the explosion occurred. The victims were reported to have purchased pyrotechnic components over the internet. One victim died six days after being admitted to the hospital, and the other brother died two weeks after the incident.
- A 53-year-old Montana man was critically burned and died after fireworks exploded in his garage. The victim was illegally manufacturing and storing display fireworks in his garage. Several witnesses heard explosions and saw the victim exiting the garage on fire. The victim was flown to a burn trauma center where he died the next day.

CPSC staff has reports of 11 fireworks related deaths for 2006, four in 2005, eight in 2004, seven in 2003, four in 2002, six in 2001, and nine in 2000. According to the Centers for Disease Control and Prevention, there were 40 fireworks-related deaths (an average of 5.7 deaths annually) between 1999 and 2005.⁵

3. National Injury Estimates for 2007

Table 1 and Figure 1 present the estimated number of non-occupational fireworks-related injuries that were treated in U.S. hospital emergency departments between 1991 and 2007.

⁵ Data from CDC for ICD 10 code W39 (1999-2005). See <http://wonder.cdc.gov/cmfi-icd10.html>. Different from CPSC statistics, the CDC statistics include both work-related and non-work-related fireworks deaths.

Table 1
Estimated Fireworks-Related Injuries 1991-2007

Year	Estimated Injuries	Injuries per 100,000 People
2007	9,800	3.2
2006	9,200	3.1
2005	10,800	3.6
2004	9,600	3.3
2003	9,300	3.2
2002	8,800	3.1
2001	9,500	3.3
2000	11,000	3.9
1999	8,500	3.1
1998	8,500	3.1
1997	8,300	3.0
1996	7,300	2.7
1995	10,900	4.1
1994	12,500	4.8
1993	12,100	4.6
1992	12,500	4.9
1991	10,900	4.3

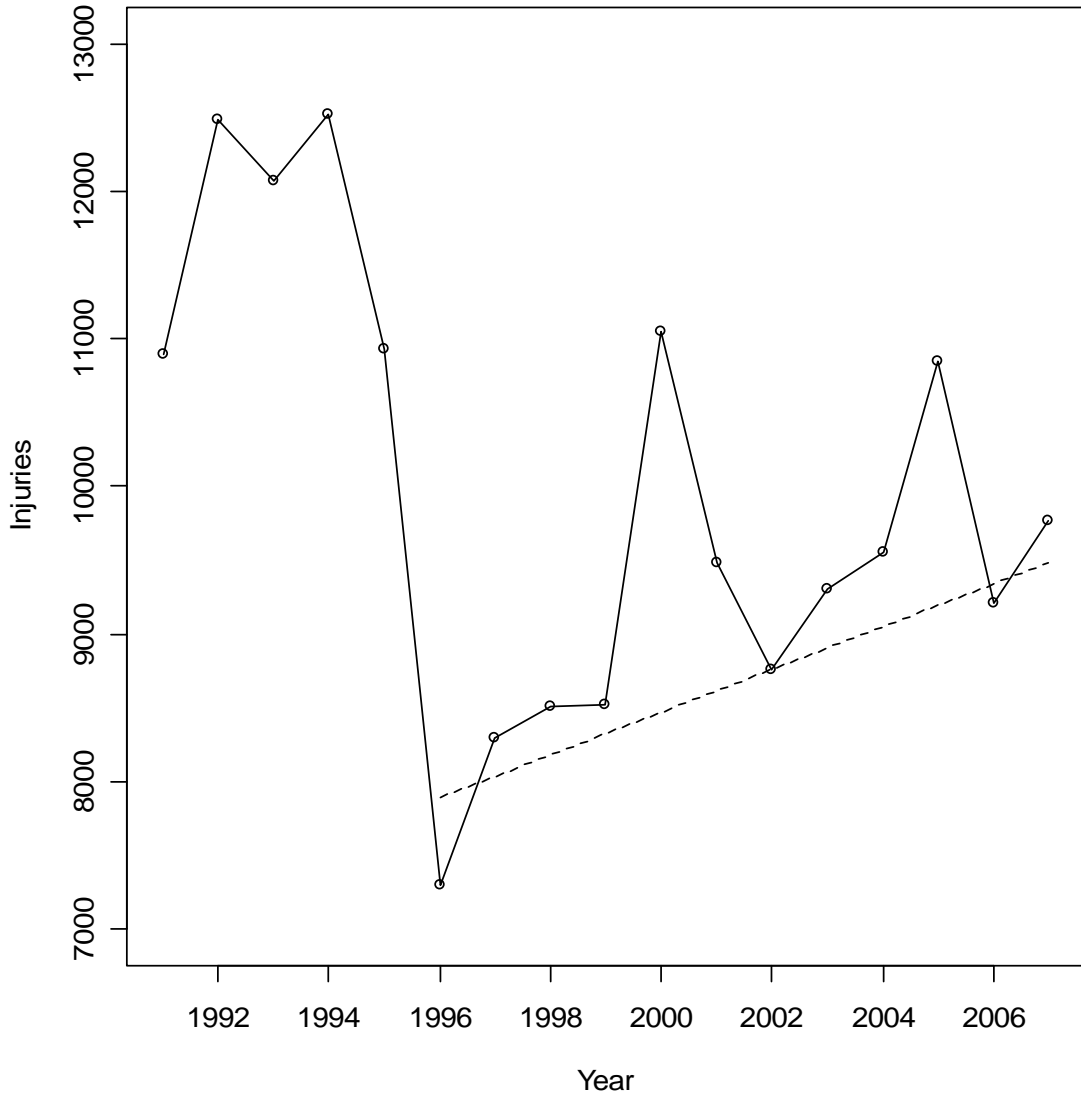
Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. The estimate for 2003 excludes an estimated 150 emergency department-treated injuries following the nightclub fire in West Warwick, Rhode Island. Estimates for 1991-1996 were revised to adjust for the changed sampling frame and do not match values published in reports for 1997 or earlier. U.S. population estimates from 1991-1999 were obtained from the U.S. Bureau of the Census at <http://www.census.gov/popest/archives/1990s/nat-total.txt> and population projections for 2000-2007 from <http://www.census.gov/popest/states/NST-ann-est.html>.

In calendar year 2007, there were an estimated 9,800 fireworks-related injuries (95 percent confidence interval 7,700 – 11,800). Total emergency department-treated injuries and per capita injuries were greater than in 2006, but the difference is not statistically significant ($p = 0.6586$). The injury estimates include one incident where the victim was transported to a NEISS hospital and died. That death was reported in the previous section.

Figure 1 shows that the highest estimated numbers of annual injuries were between the years 1991 and 1995, followed by lower estimates between 1996 and 1999. Injuries rose to 11,000 in the millennium year (2000) and then decreased to 9,500 in 2001. From the lowest annual estimate of 7,300 in 1996 to the estimate of 9,800 in 2007, there was a statistically significant upward trend.⁶

⁶ The regression line for injuries from 1996 to 2007 has a positive slope of 144.27 injuries per year (standard error = 72.72, $t = 1.98$ at 10 *df*, $p = 0.0377$ one tail). The regression procedure incorporates the sampling design. For details see Schroeder (2000) and Marker et al (1999).

Figure 1
Estimated Fireworks-Related Emergency Department-Treated Injuries
1991-2007



Appendix A presents a table showing estimated fireworks-related injuries and fireworks imports between 1997 and 2007.

4. Injury Estimates for the 2007 Special Study

The injury analysis in this section presents the results of the 2007 special study of fireworks-related injuries that were treated between June 22 and July 22, 2007. During this period, there were an estimated 6,300 fireworks-related injuries (95% confidence interval 4,500 – 8,100), accounting for about two-thirds of the total injuries for the year.

The remainder of this section contains estimates for fireworks-related injuries broken down by different categories.

Fireworks Device Types and Estimated Injuries

Table 2 shows the number and percent of emergency department-treated injuries by fireworks device type.

Table 2
 Estimated Fireworks-Related Injuries
 By Type of Fireworks Device
 June 22-July 22, 2007

Fireworks Device Type	Estimated Injuries	Percent
Total	6,300	100
All Firecrackers	1,000	16
Small	800	12
Illegal	100	1
Unspecified	200	3
All Rockets	900	15
Bottle Rockets	400	6
Other Rockets	600	9
All Other Devices	2,800	44
Sparklers	1,100	17
Fountains	100	2
Novelties	500	9
Reloadable Shells	600	10
Roman Candles	300	5
Helicopters	100	1
Homemade/Altered	100	1
Public Display	200	4
Unspecified	1,200	19

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. Based on 161 NEISS emergency department reported injuries between June 22, 2007 and July 22, 2007 and supplemented by 39 completed In-Depth Investigations (IDI). Fireworks types are reported by victims to emergency department staff or reported to telephone investigators for the IDI. Illegal firecrackers include M-80s, M-500s, Quarter Sticks, and other firecrackers banned under the Federal Hazardous Substances Act (16 CFR 1500.17). Some firecrackers and other types of fireworks may be illegal under some state and local regulations. Subtotals include categories listed directly below. Estimates rounded to nearest 100 injuries. Percentages computed from the rounded estimates. Totals for either estimated injuries or percents may not add due to rounding.

As shown in Table 2, firecrackers accounted for an estimated 1,000 emergency department-treated injuries, which was 16 percent of the total fireworks-related injuries. Most of these injuries involved small firecrackers. The estimate for illegal firecracker-related injuries was 100 injuries; however, some of the estimated 200 unspecified firecracker-related injuries and some of the estimated 1,200 unspecified fireworks-related

injuries may have involved illegal firecrackers. Sparklers accounted for an estimated 1,100 injuries, 17 percent of the total. Rockets accounted for an estimated 900 injuries, 15 percent of the total. About half the rocket injuries involved bottle rockets. In most years, firecrackers, sparklers, and rockets have been associated with about the same number of injuries.

There were a small number of injuries associated with reloadable shells, public display fireworks, and homemade or altered devices. This is also in keeping with previous years. While these devices are not involved in a large number of injuries, the larger load in these devices makes them disproportionately involved in serious injuries and deaths.

Age and Sex of Injured Persons

Children under 5 experienced an estimated 400 injuries (7 percent of all fireworks-related injuries during the special study period) as shown below in Table 3. The injury rate was 1.9 injuries per 100,000 children in that age group. Children in the 5 to 14 year age group experienced an estimated 2,200 injuries (35 percent of all fireworks-related injuries). The injury rate for children 5 to 14 years old was 5.5 injuries per 100,000 children in that age group. Breaking that age group down further, children 5 to 9 years old had 5.5 injuries per 100,000 and children 10 to 14 years old had 5.4 injuries per 100,000. Children 5 to 9 years old had the highest per capita injury rate among all age groups, slightly larger than children 10 to 14 years old. In the aggregate, children under 15 years old accounted for 42 percent of the fireworks-related injuries. Children and young adults under 20 had 54 percent of the fireworks-related injuries.

The age group 15 to 24 years old had about 24 percent of the fireworks-related injuries (1,500), slightly less than the 25 to 44 years age group with 29 percent (1,800 injuries). The per capita injury rate was 3.5 injuries per 100,000 for 15 to 24 and 2.2 for 25 to 44 year-old people. In previous years, the per capita injury rate has been observed to decrease with age for people over 14 years old.

Males had 4,400 fireworks-related injuries, representing about 70 percent of the total. The concentration of injuries among males and of victims under 25 is typical of fireworks-related injuries for previous years.

Table 3
 Estimated Fireworks-Related Injuries
 By Age and Sex
 June 22-July 22, 2007

Age Group	Total	Male	Female	Per 100,000 in the Age Group
Total	6,300	4,400	1,900	2.1
0 to 4	400	300	200	1.9
5 to 14	2,200	1,600	600	5.5
5 to 9	1,100	700	400	5.5
10 to 14	1,100	900	200	5.4
15 to 24	1,500	1,300	200	3.5
15 to 19	700	600	100	3.2
20 to 24	800	700	100	3.8
25 to 44	1,800	1,100	700	2.2
45 and older	300	100	200	0.3

Sources: NEISS, U.S. Consumer Product Safety Commission/EPHA , U.S. population from <http://www.census.gov/ipc/www/usinterimproj/usproj2000-2050.xls>; file description in <http://www.census.gov/ipc/www/usinterimproj/usproj2000-2050.txt>. See notes for Table 2.

Age and Sex of the Injured Person by Type of Fireworks Device

Table 4 shows the ages of those injured by the type of fireworks device associated with the injury. For children under 5 years old, sparklers accounted for the largest number of estimated injuries at 200, which was about half of the total injuries in that age group. Children 5 to 14 years old had an estimated 300 injuries from sparklers, fewer than the estimated 500 small firecracker injuries that accounted for the largest number of injuries in that age group.

Table 4
 Estimated Fireworks-Related Injuries
 By Device Type and Age Group
 June 22-July 22, 2007

Fireworks Type	Total	Age Group				
		0-4	5-14	15-24	25-44	45+
Total	6,300	400	2,200	1,500	1,800	300
All Firecrackers	1,000	*	600	100	300	*
Small	800	*	500	100	200	*
Illegal	100	*	100	*	*	*
Unspecified	200	*	100	*	100	*
All Rockets	900	100	200	100	400	100
Bottle Rockets	400	100	100	100	100	100
Other Rockets	600	*	200	*	300	100
Other Devices	2,800	300	900	800	700	*
Sparklers	1,100	200	300	200	300	*
Fountains	100	*	100	100	*	*
Novelties	500	*	200	100	200	*
Reloadable	600	100	100	200	200	*
Roman Candles	300	*	100	200	*	*
Helicopters	100	*	100	*	*	*
Homemade/Altered	100	*	*	*	*	*
Public Display	200	*	*	*	100	200
Unspecified	1,200	*	400	400	400	*

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. See notes for Table 2. Totals may not add due to rounding. Estimates of less than 50 injuries are shown with an asterisk (*).

As mentioned previously, males experienced 70 percent of the fireworks-related injuries and females had 30 percent. For most of the fireworks device types, that pattern also held. For example, for firecrackers and rockets, males had 70 percent of the 1,000 total injuries and females had 30 percent.

Injury Diagnosis and Body Part Injured

Table 5 presents the estimated injuries by specific parts of the body where the injury occurred. Hands and fingers, with an estimated 2,000 injuries, accounted for about 31 percent of the total injuries, followed by an estimated 1,400 eye injuries (23 percent), and 900 injuries (14 percent) to the head/face/ear region.

Burns, with 3,100 estimated injuries (50 percent), was the most frequent injury diagnosis. Contusions and lacerations, at 1,800 injuries and 28 percent of the total, was the second most frequent diagnosis.

Injuries to hands and fingers, leg injuries, and injuries to the trunk were for the most part burn injuries, while less than half the injuries to the head and face were burns. Most eye injuries were contusions and lacerations and other diagnoses that included foreign bodies in the eye.

Table 5
Estimated Fireworks-Related Injuries
By Body Part and Diagnosis
June 22-July 22, 2007

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

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. See notes for Table 2. Fractures and sprains also includes dislocations. Other diagnoses include all other injury categories. Arm and shoulder includes NEISS codes for upper arm, elbow, lower arm, shoulder, and wrist. Head/Face/Ear includes eyelid, eye area, nose, neck, and mouth. Leg includes upper leg, knee, lower leg, ankle, foot, and toe. Trunk includes lower trunk, upper trunk, pubic region, all parts of body, internal, and 25-50% of body. Estimates of less than 50 injuries are shown with an asterisk (*). Totals may not add due to rounding.

Type of Fireworks Device and Body Part Injured

Table 6 below presents estimated injuries by the type of fireworks device and body part involved.

Table 6
Estimated Fireworks-Related Injuries
By Type of Fireworks Device and Body Part Injured
June 22-July 22, 2007

Fireworks Type	Total	Body Part					
		Arm	Eye	Head/Face	Hands/Fingers	Leg	Trunk
Total	6,300	400	1,400	900	2,000	1,200	500
All Firecrackers	1,000	*	100	100	400	200	100
Small	800	*	*	100	300	200	100
Illegal	100	*	*	*	100	*	*
Size Unknown	200	*	100	*	*	*	100
All Rockets	900	200	300	100	200	200	*
Bottle Rockets	400	100	200	*	100	*	*
Other Rockets	600	100	100	100	200	200	*
Other Devices	2,800	*	500	300	1,100	700	200
Sparklers	1,100	*	100	100	600	400	*
Fountains	100	*	*	*	100	100	*
Novelties	500	*	100	100	200	100	*
Reloadable	600	*	200	100	*	100	200
Roman Candles	300	*	100	*	200	100	*
Helicopters	100	*	100	*	*	*	*
Homemade/Altered	100	*	*	*	*	*	*
Public Display	200	*	100	100	*	*	*
Unspecified	1,200	200	400	300	200	100	100

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. See notes for Table 2 and Table 5. Totals may not add due to rounding. Estimates of less than 50 injuries are shown with an asterisk (*).

About half the estimated sparkler injuries involved the hands and fingers, the same pattern as firecracker injuries. Both devices can be associated with injuries during lighting. After sparklers are lit, injuries can occur when the sparklers contact clothing, causing the clothing to burn. Also, sparks from sparklers can cause injuries when the sparklers are placed too close to the eyes or face.

Other devices that emit sparks such as novelties, fountains, and Roman Candles can also cause injuries when they come into contact with clothing or skin. Firework devices that travel such as rockets, bottle rockets, reloadable shells, and public display fireworks can result in injuries anywhere on the body.

Hospital Treatment

Although 94 percent of the fireworks-related injuries were characterized as “treat and release,” an estimated 3.6 percent of victims (230 estimated emergency department-treated injuries) were treated and transferred to another hospital; and another 1.8 percent (110 estimated injuries) were admitted to the hospital. An estimated 1 percent of injuries involved patients who left the emergency department before being seen.⁷ The treat and release percentage was about the same as for all injuries.

As mentioned previously, one victim died, but that case is not counted in these totals because the incident occurred after the end of the special study period.

5. Telephone Investigations of Fireworks-Related Injuries

CPSC staff assigned telephone investigations of some fireworks injuries that occurred during the one-month special study period surrounding the July 4th holiday (June 22 to July 22, 2007). Completed telephone investigations provide more detail about the incident and injury than the emergency department record that is summarized in the NEISS hospital record. In the telephone questionnaire, respondents were asked about how the injury occurred (hazard pattern), the medical care following the emergency department treatment, and the long-term effects, if any, of the injury. Also, respondents were asked about the source of the fireworks that were associated with the injury.

Most of the cases selected for telephone investigations were chosen because the injuries were among the most severe that were reported by the NEISS hospitals. From the point of view of learning how to prevent the most serious injuries, staff wanted to determine the scenarios where such injuries occurred. As a result, these cases are representative of the most serious injuries, not typical fireworks-related injuries.

From the 161 emergency department-treated fireworks-related injuries during the special study period, CPSC staff assigned 80 incidents for telephone investigations, of which 39 (49 percent) were completed. Table 7 shows the final status of the investigations.

⁷For all injuries in 2007, 93.2 percent of patients were treated and released, 1.0 percent were transferred to other hospitals, 4.6 percent were admitted to the hospital, and 1.2 percent had other dispositions including Left Without Being Seen.

Table 7
Final Status for Telephone Investigations

Final Case Status	Number of Cases	Percent
Total Assigned	80	100
Completed	39	49
Failed to Reach Patient	14	18
Questionnaire Mailed but Not Returned	17	21
Victim ID Not Provided by Hospital	5	6
Victim Refused to Cooperate	5	6

Note: Totals may not add due to rounding.

Of the 39 completed cases above, all but two were assigned as part of the fireworks project special study. One additional completed case was assigned under the Children’s Clothing Ignition project and one completed case was assigned under the National Institute of Child Health and Human Development Study on Youth with Developmental Disabilities.

Short descriptions of the 39 completed cases are found in Appendix B. The cases are organized in order of emergency department dispositions with Admitted (to the hospital) first, followed by Treated and Transferred (to another hospital) and then Treated and Released. Within disposition, cases are organized by the age of the victim.

Summary Statistics

Of the 39 completed cases, 26 (67 percent) involved males and 13 (33 percent) involved females. There were 13 victims age 15 years or younger (33 percent), and 21 victims were between 16 and 40 years of age (54 percent). There were five victims over 40 years old (one 41, one 43, one 51, one 61, and one 79). Five victims were admitted to the hospital (13 percent), three were treated at the emergency department and transferred to another hospital (8 percent), and 31 (80 percent) were treated and released.

The most frequently used fireworks device in these incidents was aerial shells (14 cases, 36 percent), followed by rockets and bottle rockets (6 cases collectively, 15 percent). There were three incidents involving public display fireworks, and three involving Roman Candles. There were also three incidents involving sparklers; however, two of these incidents involved several sparklers tied together, an unconventional and highly dangerous way to use sparklers. Two incidents involved ground spinners/novelty devices. Of the remaining eight incidents, four were associated with a variety of other

fireworks devices, each accounting for a single incident; and in four incidents, the type of firework was not known to the victim.

Note that the distribution of the type of fireworks devices in the telephone investigations is different from Table 2 (all estimated fireworks injuries), and the distribution of emergency department dispositions is different from the special study cases. This reflects the focus on investigating the more serious injuries.

Hazard Patterns

The hazard patterns described below are based on the incident descriptions obtained during the telephone investigations and summarized in Appendix B. When an incident has two or more hazard patterns, the hazard pattern most likely to have caused the injury was selected. Hazard patterns are presented in descending order of occurrence in Table 8.

Table 8
Hazard Patterns in Telephone Investigations of Fireworks-Related Injuries

Hazard Pattern	Number of Cases	Percent
All	39	100
Misuse	9	23
Errant Flight Path	8	21
Early/Late Ignition	7	18
Tipover	6	15
Sparks, Debris	5	13
Other Malfunction	2	5
Other	1	3
Unknown	1	3

Note: Totals may not add due to rounding.

Misuse (9 incidents, 23 percent)

Nine victims were injured when fireworks were used in ways that depart from how they are typically used.

A person threw a lit firework on the ground behind an 18-year-old female victim in Case 1. The firework then ignited her skirt, causing burns to her legs and lower trunk. She was hospitalized for two days for treatment of the burns. Case 3 and Case 5 involved

injuries from sparkler bombs (homemade fireworks constructed by tying together a number of sparklers). As shown by the incident descriptions, this can be very dangerous. In Case 3, when the sparkler bomb was lit, the explosion caused lacerations to the 19-year-old male victim's leg and arm, powder burns to his face, and blew off part of his index finger. The victim was hospitalized for four days and had surgery. In Case 5, the sparkler bomb blew up in the 25-year-old male victim's hand. The victim was admitted to the hospital and had surgery. According to the telephone investigation, he is unable to bend his thumb and cannot write with his right hand.

Case 6 involved an injury to a 13-year-old male. A man handed a lit Roman Candle to a small boy. When the firework started emitting flaming balls, the boy panicked and spun around, accidentally pointing the firework at the victim. Some of the flaming balls went into the victim's mouth. In Case 7, a five-year-old boy threw a firework (type unknown) into a fire pit. The 16-year-old male victim was standing near the fire pit and the firework exploded in his face. The victim was transferred to the burn unit of another hospital for treatment of facial burns.

A 16-year-old male in Case 22 dropped a lit fuse into an empty launching tube that had previously been used to launch mortar shells. There was some flash powder residue in the tube from those shells. The flash powder ignited resulting in second degree burns to the victim's hand. Case 24 involved a 17-year-old male who put a small firecracker into a glass bottle. When he then lit the firecracker, the bottle shattered causing glass to be embedded in the victim's arm and chest. In Case 31, the 28-year-old female victim was watching people set off fireworks. Some children put several aerial shells into a launching tube that was designed to launch one at a time. After being lit, the tube fell over, launching the firework directly at the victim. She was struck in the lower back and received a second degree burn.

In Case 33, a 33-year-old male, who was reported to have been intoxicated, held an aerial shell in his hand instead of placing it in a launching tube. His friend lit the shell which then exploded, resulting in first degree burns to the victim's hand, wrist and forearm.

Errant Flight Path (8 incidents, 21 percent)

Aerial shells are designed to go into the air after being lit. Injuries occurred when the shell traveled horizontally. Such injuries may be caused by the launching tube being misaimed, a malfunction in the shell, or the device tipping over. If the victim is not near the device, then the reason for the errant flight path is usually unknown and may involve tipover. Incidents involving tipover are discussed in a later section.

In Case 8, a 22-year-old female was hit in the eye by a rocket that she had launched. Before the incident, she had already launched several bottle rockets without any problem. Then she launched a bottle rocket that went directly into her eye instead of ascending. She had a corneal abrasion and burn. After being treated at the emergency

department, she was transferred to another hospital for treatment. Case 9 involved a 6-month-old male child who was hit by a small rocket or bottle rocket launched by some children. He experienced a burn to the lip. Similarly, in Case 13, a 9-year-old female was hit in the leg by a rocket or bottle rocket launched by a neighbor. She had a burn to her upper thigh.

A 16-year-old-male in Case 23 bent down to retrieve a spent firework. At the same time, someone lit an aerial firework that traveled sideways and struck the victim in the shoulder. Sideways travel of an aerial shell was also associated with an eye injury to a 25-year-old male in Case 28. In Case 32, a 32-year-old-female was struck in the head at a public display by a firework that had been launched but did not ascend the full distance. The victim experienced a burn to her scalp. Also, a 61-year-old woman, in Case 38, was hit in the eye by a rocket launched by teenagers across the street from her house. She does not know if she will ever fully recover from the injury. She reported to the telephone interviewer that she is suffering from blurred vision. Finally, in Case 39, a 79-year-old male was watching the community fireworks in an open field. An aerial firework that traveled horizontally, rather than vertically, struck the victim in the stomach and right arm. The victim was treated for burns at the emergency department.

Early or Late Explosion (7 incidents, 18 percent)

Victims were injured when the firework exploded earlier or later than anticipated. When exploding too early, the victim may be unable to throw the device or move away from it. Alternatively, when devices take too long to go off, the victim may believe that the device is out. They may then be injured when they pick it up or approach it. Victims reported early or late explosions in the scenarios below.

In Case 2, a 19-year-old man lit a large firecracker that he held in his hand. The firework exploded before he was able to throw it. The explosion resulted in two fractures to his fingers. The victim was admitted to the hospital and remained for three days. In Case 17, a boy lit a rocket that might have had a defective fuse. When it appeared to be going off earlier than he expected, he dropped the rocket on the 14-year-old male victim's lap. The rocket exploded and went under the victim's shorts, resulting in second and third degree burns to his thighs.

In Case 25, the 21-year-old victim placed a mortar shell in a launching tube, then lit the fuse. The shell exploded immediately, resulting in a cut to the victim's eye and flash burns to both eyes. In Case 26, a 21-year-old male victim lit the fuse on a firework that exploded immediately in his face. The victim was unable to describe the type of firework. He had second degree burns to his face. In Case 27, a 23-year-old male lit a mortar shell that launched before he could move away. The victim was burned on his eyes.

In a case with an unknown firework type, Case 30, a 25-year-old male lit a firework that exploded immediately in his hand. He was initially treated and released at

the hospital but went back to the hospital for surgery to remove his right index finger. The victim also has lost some of the use of his right middle finger. Also in a similar case with an unknown fireworks type, Case 34, a 39-year-old man lit a firework that immediately exploded in his hand.

Tipover (6 incidents, 15 percent)

Tipovers are a cause of errant flight paths for aerial shells and rockets. With these incidents, the injury may occur at some distance from where the firework was launched and the victim is often different from the person who lit the firework. Note that some of the cases listed under errant flight paths may also have involved tipovers, but are so listed because the victim, having not observed the launching of the fireworks device, did not report the incident as a tipover. All tipover cases involved treat and release injuries.

In Case 10, a 2-year-old female was near some people who were launching aerial shells. When a shell was lit, the tube tipped over, causing the shell to travel horizontally, then striking the victim in the side. The victim received burns to her left side and upper thigh. In another incident, Case 12, an 8-year-old female was burned on her left knee when a fountain that she had lit tipped over, emitting sparks and flame. Case 16 involved a bottle rocket that hit the 11-year-old male, who had lit the firework, in the foot. This occurred because the launcher tipped over.

In Case 21, the launching tube for an aerial shell leaned over when a friend of the 16-year-old male victim lit the firework. A piece of the shell hit the side of his left eye, burning his eyelashes. The victim experienced some loss of vision directly after the incident but then recovered fully in three weeks. The 25-year-old male victim in Case 29 was not injured by the aerial shell firework that launched normally but, instead, was injured by the base. The victim's toe was cut when the base tipped over after the launch. The victim had stitches at the emergency department to close the laceration. A 41-year-old female in Case 35 was injured when the launching tube for a mortar shell tipped over. The victim was struck in the chin by the shell after it was launched. That injury required ten stitches.

Sparks, Debris (5 incidents, 13 percent)

Hot embers, sparks, and debris from fireworks explosions were associated with five injury incidents.

Case 11 describes an incident where a 6-year-old female was holding a Roman Candle firework in her hand. Sparks from the firework then got in her eye, resulting in burns that were treated at the emergency department. In Case 14, sparks from an aerial firework got into the 9-year-old victim's eye. In a similar case, Case 19, debris from an aerial firework entered the eye of the 15-year-old male victim, who was lighting fireworks with a friend.

In Case 36, a 43-year-old woman lit a sparkler that then went out. When she lit it again, the device emitted sparks that burned her hand. A 51-year-old female was injured at a public display when debris or ashes from aerial fireworks went into her eyes, as described in Case 37.

Other Malfunctions, Other Hazard Patterns, and Unknown Hazard Pattern (4 incidents, 11 percent)

Other Malfunctions. An 11-year-old male in Case 15 lit a “bumble bee” novelty type firework that immediately went out. When he lit it the second time, it exploded before he could put it on the ground. The victim was burned in the eye and face, but has fully recovered from his injury. In Case 18, the 14-year-old male victim’s brother lit a smoke bomb where something blew out of the non-fuse end and hit the victim in the stomach. The victim had a contusion to his stomach.

Other Hazard Patterns. In Case 4, a 20-year-old male found a firecracker that he thought was a small fountain-type firework. He lit it, expecting that a shower of sparks would be emitted. Instead, the firecracker exploded in his hand blowing off the tips of his fingers. He was hospitalized for surgery and physical therapy and may never recover full use of three fingers.

Unknown Hazard Pattern. In Case 20, a victim was struck by an aerial shell in the stomach. There are no other details available about the incident.

Long-Term Consequences of Fireworks-Related Injuries

Victims were asked if there were any long-term consequences of their injuries. Most expected a complete recovery. Some victims where full recovery was uncertain reported the following:

- Case 4. A 20-year-old male lost the tips of three fingers after a firework exploded in his hand. He may never regain the fine motor coordination and full use of the fingers.
- Case 5. The 25-year-old male victim, who had a sparkler bomb blow up in his hand, is unable to bend his thumb and cannot write with his right hand.
- Case 30. A 25-year-old male returned to the hospital one week after the injury for surgery to amputate his right index finger. He has also lost the use of the middle finger. The injury was caused by an unknown type of firework that exploded while the victim was holding it.

- Case 38. The 61-year-old female, who was hit in the eye by a rocket, does not know if she will fully recover. She reported to the telephone interviewer several weeks after the injury that she was still experiencing blurred vision.

Where Fireworks Were Obtained

Of the 39 respondents to the telephone survey, 23 (59 percent) knew where the devices were obtained. The largest response categories were “a stand that sells only fireworks” (13 cases), “a friend or relative” (4 cases), and display fireworks at public displays (3 cases). One case involved a homemade firework found in the trash, one a firework purchased at a store, and one purchased at a gas station.

Victims reported that they did not know the source of the fireworks in 16 incidents (41 percent). That typically is the situation when the victim did not purchase or light the fireworks device that caused the injury.

6. Enforcement Activities

CPSC’s Office of Compliance and Field Operations enforces regulations for fireworks devices that are sold to consumers under provisions of the Federal Hazardous Substances Act. CPSC staff’s enforcement activities are focused on reducing the number of fireworks-related deaths and injuries. A variety of enforcement techniques and both national and international initiatives were utilized in 2007 to keep unsafe fireworks from consumers.

CPSC staff continues to work closely with the Bureau of Customs and Border Protection (Customs) to conduct surveillance on imported shipments of fireworks. Fireworks were selected for testing based on the past violation history of the type of device, whether the item had been sampled previously, and other factors. With assistance from Customs, staff from CPSC selectively sampled and tested over 400 shipments of imported fireworks in fiscal year 2007 to determine if they were in compliance with the Federal Hazardous Substances Act. Of those, approximately 46 percent were found to contain fireworks that were noncompliant.

Another enforcement activity that continues to remain a priority for CPSC staff is the investigation into firms and individuals that offer kits and components to make illegal and dangerous firecracker type explosives, such as M-80s and Quarter Sticks. Since 2006, CPSC staff, working with the Department of Justice, has completed seven cases resulting in the companies and/or individuals involved being prohibited from selling the chemicals and components to make illegal fireworks.

CPSC staff participated in several multi-state criminal investigations. Staff worked with other Federal agencies, including the Bureau of Alcohol, Tobacco, Firearms and Explosives, the Department of Justice’s Office of Consumer Litigation, as well as

state and local law enforcement agencies. Staff provided legal, field, and technical support in cases involving the distribution of illegal explosive devices and the illegal diversion of professional fireworks to consumers.

Reflecting the international global economy, it is important to understand that most fireworks are not manufactured in the U.S. Most are imported from two places, China (97 percent of all fireworks) and Hong Kong (2 percent).⁸ CPSC's agreement and subsequent Work Plans with its counterpart Chinese agency, the General Administration for Quality Supervision, Inspection and Quarantine (AQSIQ), provide for extensive information exchange and cooperation. The first U.S.-China Safety Summit in Beijing during 2005 provided a platform for planning specific activities, culminating in the CPSC/AQSIQ Action Plan on Consumer Product Safety.

In accordance with the Action Plan, AQSIQ and CPSC established four working groups focusing on fireworks, toys, lighters, and electrical products. The Work Plans for these were presented at the 2nd U.S.-Sino Safety Summit held in Washington, D.C., on September 11, 2007 and are being implemented across the four product areas.

Specifically, the Chinese government has agreed to cooperate on product safety for fireworks and the other products through the following tasks:

- Exchange of information on standards
- Training on product testing
- Exchange of information on emerging hazards
- Increased inspection of high risk products, including fireworks
- Tighter controls on the quality of inputs from sub-suppliers.

CPSC's Office of Compliance and Field Operations and Office of International Programs and Intergovernmental Affairs (EXIP) took the lead on these projects.

⁸ This data is from 2007 statistics from the U.S. International Trade Commission. There were 260 million pounds of fireworks imported, with 252 million pounds from China and 5.8 million from Hong Kong. Staff believes that most fireworks imported from Hong Kong were actually manufactured in China. The next largest exporter was Thailand with 1.5 million pounds.

7. Summary

In 2007, the number of reported fireworks-related deaths, 11, was the same as in 2006. Estimated emergency department-treated injuries at 9,800 for 2007 were greater than in 2006, but the difference was not statistically significant. The upward trend in injuries from 1996 to 2007 was statistically significant.

During the one-month special study period of June 22 to July 22, 2007, there were an estimated 6,300 emergency department-treated injuries, slightly less than the 2006 estimate of 6,400 injuries. Similar to previous years, in 2007 children under 15 years old experienced more than 40 percent of the injuries and males of all ages experienced 70 percent of the injuries.

Also similar with previous years, more than half the injuries in 2007 involved burns. Burns were the most frequent injury to all parts of the body except the eyes, where contusions, lacerations, and foreign body injuries occurred more frequently. The parts of the body most often injured were hands (estimated 2,000 injuries), eyes (1,400 injuries), legs (1,200 injuries), and the head, face and ear (900 injuries). Most injuries, 94 percent, involved treat and release dispositions. An estimated 5 percent were treated and transferred to another hospital or admitted to the hospital where the emergency department was located.

Among different types of fireworks, sparklers were associated with the greatest number of estimated injuries at 1,100. Firecrackers were the second most frequent with an estimated 1,000 injuries followed by rockets at 900 injuries.

A review of data from telephone follow-up investigations showed that the typical causes of injuries were as follows: (1) misuse of fireworks, (2) fireworks exploding earlier or later than expected, (3) errant flight paths, (4) sparks or debris from fireworks igniting fires, and (5) other malfunctions. At the time of the telephone investigation, typically one to two months after the injury, most victims already had recovered from their injuries. A small number of victims reported that the injuries were likely to have long-term effects.

Finally, in 2007, CPSC staff's enforcement activities remained at a high level. CPSC's Office of Compliance and Field Operations worked with the Bureau of Customs and Border Protection to sample imported fireworks and to seize illegal shipments. Staff provided legal, field, and technical support in cases involving the distribution of illegal explosive devices and the illegal diversion of professional fireworks to consumers. Staff also participated in working groups with the General Administration for Quality Supervision, Inspection and Quarantine (AQSIQ) of the Government of the People's Republic of China. China is the world's largest exporter of fireworks, and most fireworks imported into the U.S. come from China. Fireworks is one of four product areas targeted by CPSC and the AQSIQ for exchange of information on standards, increased inspection of high risk products, and tighter quality controls on components from parts suppliers.

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Appendix A
Fireworks-Related Injuries and Imports

Table A-1 below shows that during the last 10 years, the amount of fireworks (in weight) imported into the U.S. has more than doubled. Except for the millennium year of 2000, the number of estimated emergency department-treated injuries has fluctuated between 8,300 and 10,800 with increases in 2003, 2004 and 2005. During this same period, as shown in the table below, the number of injuries per 100,000 pounds of fireworks has declined between 2000 and 2007 from 7.5 injuries per 100,000 pounds to 3.8 injuries per 100,000 pounds in 2007. The injury estimates peaked in 2000. The increased number of injuries was probably associated with activities during the millennium celebrations.

Table A-1
Estimated Fireworks-Related Injuries and
Estimated Fireworks Imported into the U.S. 1997-2007

Year	Estimated Injuries	Estimated Fireworks Imports (millions of pounds)	Injuries Per 100,000 Pounds
2007	9,800	260.1	3.8
2006	9,200	272.1	3.4
2005	10,800	275.1	3.9
2004	9,600	230.0	4.2
2003	9,300	214.6	4.3
2002	8,800	175.3	5.0
2001	9,500	155.3	6.1
2000	11,000	146.2	7.5
1999	8,500	146.7	5.8
1998	8,500	123.8	6.9
1997	8,300	103.5	8.0

Source: Injuries from NEISS, U.S. Consumer Product Safety Commission/EPHA. See Table 1 for further details. Estimated fireworks imports from the U.S. International Trade Commission using Harmonized Tariff Schedule (HTS code 360410). Imports include consumer and display fireworks. These totals exclude fireworks manufactured in the U.S. for domestic consumption, which is likely to be small relative to imports.

This table should be interpreted with caution. First, the logical unit of exposure is number of devices consumed instead of the weight of the devices, because a person is exposed to injury when a device is consumed (i.e., lit). Injuries per 100,000 fireworks devices imported might be more meaningful. Weight over-represents heavy devices and under-represents light devices. There is no reason to assume that a heavy device is

inherently more dangerous than a light device because the weight of the device includes other things than just the amount of explosive material.

Second, we do not have data to break down the weight in Table A-1 by fireworks device types. As shown above in Table 2, different fireworks devices have different numbers of injuries. As a result, it is unclear if the increase in consumption in recent years is across the board; greater in the larger and heavier display shells that historically have produced few injuries; or in firecrackers, sparklers, and small rockets that produce the majority of the injuries.

Appendix B
Completed Telephone Investigations

Case	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
1	18	Female	Thermal Burns	Admitted	Lower Trunk	Unknown	A person threw a lit firework on the ground behind the victim. The firework ignited her skirt, causing burns to her legs and lower trunk.	The victim was hospitalized for 2 days for burn treatment. Aside from scarring, she is expected to fully recover in six months to a year.
2	19	Male	Fracture	Admitted	Finger	Large Firecracker	A firecracker exploded while the victim was holding it in his hand.	Explosion took off skin from the victim's fingers and also caused two fractures of those fingers. The victim fully recovered in one month.
3	19	Male	Amputation	Admitted	Finger	Sparkler	The victim made a sparkler bomb that went off prematurely. The explosion caused lacerations to his leg, powder burns to face and chest, a hole in his left arm and blew off the tip of his index finger.	The victim was hospitalized for 4 days and had surgery. Aside from the loss of the tip of his finger, the victim has fully recovered.
4	20	Male	Amputation	Admitted	Finger	Homemade Firecracker	The victim found a homemade firecracker. He lit it and held it, thinking that it was a fountain. It exploded in his hand.	The victim was admitted to the hospital for three days for surgery and therapy. Recovery anticipated to take two or three months. May never regain fine motor coordination and full use of three fingers.
5	25	Male	Amputation	Admitted	Finger	Sparkler	Victim lit a sparkler bomb (several sparklers tied together). The device blew up in his hand.	The blast injured the victim's right thumb and burned his hand. The victim was admitted to the hospital and had surgery. The victim is unable to bend his thumb and cannot write with his right hand.

Case	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
6	13	Male	Thermal Burns	Treated and Transferred	Mouth	Roman Candle	A man handed a lit Roman Candle to a small boy. When the firework started emitting flaming balls, the boy spun around, accidentally pointing the Roman Candle at the victim. Some of the flaming balls went into the victim's mouth.	The victim had second degree burns to his lips, tongue and the roof of his mouth. He was transferred to the burn unit of a nearby hospital and admitted for 4 days. He recovered completely after two weeks.
7	16	Male	Thermal Burns	Treated and Transferred	Face	Unknown	A five-year-old boy threw a firework into a fire pit. The firework exploded in the victim's face.	1st and 2nd degree burns to the face, nose and mouth. The victim was transferred to a burn unit for additional treatment. He anticipates full recovery in a month.
8	22	Female	Other/Not Stated	Treated and Transferred	Eye	Rocket	The victim had already launched several bottle rockets. Then a rocket that she launched went into her eye.	Victim had a corneal abrasion and burn. Full recovery in 3 months and no long term effects.
9	6 mos	Male	Laceration	Treated and Released	Face	Bottle Rocket	The 6-month-old victim was hit by a small rocket or bottle rocket launched by some children in a parking lot.	Burn to the lip. Subsequent medical checkup and full recovery in two weeks.
10	2	Female	Thermal Burns	Treated and Released	Upper Trunk	Aerial Shell	People close to the victim lit an aerial shell that tipped over in the launching tube. The shell traveled sideways striking the victim in the left side.	Burns to left side and left upper thigh. The victim recovered completely following Emergency Department treatment.
11	6	Female	Thermal Burns	Treated and Released	Eye	Roman Candle	The victim was holding a Roman Candle in her hand. Sparks from the Roman Candle got into her right eye.	Burn to the right eye. Fully recovered after Emergency Department treatment.
12	8	Female	Thermal Burns	Treated and Released	Knee	Fountain	A fountain tipped over, emitting sparks and flame that hit the victim in the knees.	The victim had 2nd degree burns on left knee, slight burn on right. Fully recovered after Emergency Department treatment.

Case	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
13	9	Female	Thermal Burns	Treated and Released	Upper Leg	Rocket	The victim was hit in the leg with a rocket or bottle rocket lit by a neighbor.	Burn to upper thigh. She recovered fully after Emergency Department treatment.
14	9	Female	Foreign Body	Treated and Released	Eye	Aerial Shell	Sparks from aerial fireworks entered the victim's eye.	Victim recovered in two weeks following the Emergency Department visit.
15	11	Male	Thermal Burns	Treated and Released	Eye	Ground Spinner / Novelty	Victim lit a "bumble bee" type firework that then went out. On the second attempt, the firework exploded when it was lit.	The victim experienced corneal burns and burns to the face. Victim went to an eye specialist. Fully recovered in 4 days.
16	11	Male	Contusions, Abrasions	Treated and Released	Foot	Bottle Rocket	The launcher tipped over after the rocket was lit. The rocket hit the victim in the foot.	The victim recovered fully after treatment in the Emergency Department.
17	14	Male	Thermal Burns	Treated and Released	Lower Leg	Bottle Rocket	Another child lit a rocket that had appeared to have defective fuse. When ignited, the child panicked and dropped the rocket on the victim's lap. The lit rocket went under the victim's shorts.	The victim experienced second and third degree burns on his legs. After follow up treatment, victim has fully recovered.
18	14	Male	Contusions, Abrasions	Treated and Released	Upper Trunk	Ground Spinner / Novelty	The victim's brother lit a smoke bomb, where something blew out of the end and hit the victim in the stomach.	The victim had a contusion to his stomach. Treated at the Emergency Department and fully recovered.
19	15	Male	Other/Not Stated	Treated and Released	Eye	Aerial Shell	The victim and a friend were lighting aerial fireworks. Debris from one firework got in his eye.	The victim was treated at Emergency Department for minor abrasion to his eye. Full recovery in two days.
20	15	Male	Thermal Burns	Treated and Released	Lower Trunk	Aerial Shell	Details of the incident are unknown. Victim was burned on the stomach.	In addition to the Emergency Department treatment, the victim required additional medical treatment. Full recovery in 5 or 6 weeks.
21	16	Male	Thermal Burns	Treated and Released	Face	Aerial Shell	The launching tube leaned over when the firework was lit. A piece of the shell hit the victim's left eye.	Initially, the victim experienced some loss of vision directly after the incident. Victim recovered fully in three weeks.

Case	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
22	16	Male	Thermal Burns	Treated and Released	Hand	Aerial Shell	The victim dropped a lit fuse into an empty mortar tube. The flash powder residue in the tube ignited and flamed up on his hand.	The victim had 2nd degree burns on his left hand. He had additional medical treatment. Full recovery in 3 weeks.
23	16	Male	Thermal Burns	Treated and Released	Shoulder	Aerial Shell	The victim bent down to retrieve a spent firework. Someone lit a firework that traveled sideways and hit victim in the shoulder.	Victim fully recovered after treatment in the Emergency Department.
24	17	Male	Laceration	Treated and Released	Upper Trunk	Small Firecracker	The victim lit a small firecracker and put it into a glass bottle. The bottle shattered when the firework exploded.	The victim had glass embedded in his right arm. After Emergency Department treatment, the victim fully recovered.
25	21	Male	Laceration	Treated and Released	Eye	Aerial Shell	The victim lit a mortar shell that immediately exploded.	The victim had a cut on his eyeball, and flash burns to both eyes. After treatment at the Emergency Department, the victim fully recovered.
26	21	Male	Burns, Radiation	Treated and Released	Face	Roman Candle	The victim lit the fuse on a firework that exploded immediately in his face.	The victim had 2nd degree burns to his face. After Emergency Department treatment, victim had full recovery.
27	23	Male	Thermal Burns	Treated and Released	Eye	Aerial Shell	A male victim lit a mortar shell and did not move away fast enough before the shell launched.	The blast from the explosion resulted in burns to the victim's eyes. The victim recovered in three weeks with no long term effects.
28	25	Male	Thermal Burns	Treated and Released	Eye	Aerial Shell	The victim was struck in the eye by an aerial shell that traveled sideways instead of vertically.	Corneal burns. Full recovery a week after the injury.
29	25	Male	Laceration	Treated and Released	Toe	Aerial Shell	The victim lit the firework, which then launched normally, however the base fell over and cut the victim's toe.	The victim had two stitches to close up the laceration in his foot. Fully recovered in two weeks.

Case	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
30	25	Male	Other/Not Stated	Treated and Released	Hand	Unknown	The victim lit the fuse on a firework that exploded immediately in his hand.	The victim was initially treated and released. He went back to the hospital one week later for surgery to amputate his right index finger. The victim has also lost some of the use of his right middle finger.
31	28	Female	Thermal Burns	Treated and Released	Lower Trunk	Aerial Shell	Some children loaded a launching tube with several aerial fireworks. The tube fell over and began launching fireworks toward bystanders. The victim was struck in the lower trunk by the aerial shell.	The victim had a second degree burn to her lower back that later became infected. Full recovery expected in three months.
32	32	Female	Thermal Burns	Treated and Released	Head	Public Display	The victim was struck in the head by a display firework that descended shortly after launching without exploding.	The victim experienced a burn to the scalp. Full recovery after treatment in the Emergency Department.
33	33	Male	Thermal Burns	Treated and Released	Hand	Aerial Shell	The victim, who was intoxicated, held an aerial shell in his hand, instead of placing it in a launching tube. His friend lit the shell, which then exploded.	The victim received first degree burns to hand, wrist and forearm. Full recovery.
34	39	Male	Laceration	Treated and Released	Hand	Unknown	The victim lit a firework that exploded in his hand.	The victim had very deep laceration to several fingers and his palm. He returned for surgery and then to remove stitches. Despite some scarring, the victim had fully recovered after five to six weeks.
35	41	Female	Laceration	Treated and Released	Face	Aerial Shell	The launching tube fell over when a person (not the victim) lit a mortar shell. The victim was struck in the chin.	The victim's cut on her chin required 10 stitches. Fully recovered in one week.

Case	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
36	43	Female	Thermal Burns	Treated and Released	Finger	Sparkler	The victim lit a sparkler once and it went out. She lit it again. The second time it sparked and burned her hand.	The victim fully recovered after treatment in the Emergency Department.
37	51	Female	Thermal Burns	Treated and Released	Eye	Public Display	Debris or ashes from aerial fireworks at a public display went into victim's eye.	The victim's right eye was burned. After treatment at the Emergency Department, the victim has fully recovered.
38	61	Female	Laceration	Treated and Released	Eye	Rocket	The victim was hit in the eye by a rocket launched by teenagers across the street from her house.	The victim does not know if she will fully recover. She reported having blurred vision.
39	79	Male	Burns, Radiation	Treated and Released	Lower Trunk	Public Display	The victim was watching community fireworks in an open field. An aerial firework was launched and went sideways instead of vertically. Victim struck in the stomach and right arm.	The victim received burns to stomach and right arm. He recovered completely in 20 days.