

(a) Within 2 months after the effective date of this AD, and thereafter at intervals not to exceed 1,250 landings: Perform an inspection to verify correct operation of the MLG downlock actuator having P/N 201218001, 201218002, 201218003, or 201218004, all serial numbers, in accordance with Fokker Service Bulletin SBF100-32-072, dated March 30, 1993, and Dowty Aerospace Hydraulics Service Bulletin F100-32-505, Revision 1, dated April 16, 1993.

(1) If the MLG downlock actuator operates as specified in the inspection procedure contained in the Accomplishment Instructions of Dowty Aerospace Hydraulics Service Bulletin F100-32-505, Revision 1, dated April 16, 1993, prior to further flight, record the accomplishment of the inspection on the unit nameplate in accordance with the Dowty Aerospace Hydraulics service bulletin. Following accomplishment of each subsequent inspection required by this AD, record the accomplishment of the inspection in accordance with the requirement of this paragraph.

(2) If any MLG downlock actuator does not operate as specified in the inspection procedure contained in the Accomplishment Instructions of Dowty Aerospace Hydraulics Service Bulletin F100-32-505, Revision 1, dated April 16, 1993, prior to further flight, replace the downlock actuator with a serviceable unit, in accordance with Chapter 32-32-05 of the Aircraft Maintenance Manual. Thereafter, perform repetitive inspections of the replacement unit in accordance with paragraph (a) of this AD until the replacement required by paragraph (b) of this AD is accomplished.

(b) Within 9 months after the effective date of this AD, replace any MLG downlock actuator having P/N 201218001, 201218002, 201218003, or 201218004, any serial number, with an improved unit having P/N 201218005, 201218006, 201218007, or 201218008, respectively; in accordance with Fokker Service Bulletin SBF100-32-074, dated July 21, 1993, and Dowty Aerospace Hydraulics Service Bulletin F100-32-506, dated June 9, 1993. Accomplishment of this replacement constitutes terminating action for the repetitive inspections required by paragraph (a) of this AD.

(c) As of the effective date of this AD, no person shall install on any airplane a MLG downlock actuator having P/N 201218001, 201218002, 201218003, or 201218004, any serial number.

(d) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Standardization Branch, ANM-113, FAA, Transport Airplane Directorate. Operators shall submit their requests through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, Standardization Branch, ANM-113.

Note 2: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Standardization Branch, ANM-113.

(e) Special flight permits may be issued in accordance with sections 21.197 and 21.199

of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

(f) The actions shall be done in accordance with Fokker Service Bulletin SBF100-32-072, dated March 30, 1993; Fokker Service Bulletin SBF100-32-074, dated July 21, 1993; Dowty Aerospace Hydraulics Service Bulletin F100-32-505, Revision 1, dated April 16, 1993; or Dowty Aerospace Hydraulics Service Bulletin F100-32-506, dated June 9, 1993, as applicable. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from Fokker Aircraft USA, Inc., 1199 North Fairfax Street, Alexandria, Virginia 22314. Copies may be inspected at the FAA, Transport Airplane Directorate, 1601 Lind Avenue, SW., Renton, Washington; or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

(g) This amendment becomes effective on April 25, 1996.

Issued in Renton, Washington, on March 19, 1996.

James V. Devany,

Acting Manager, Transport Airplane Directorate, Aircraft Certification Service.

[FR Doc. 96-7133 Filed 3-25-96; 8:45 am]

BILLING CODE 4910-13-P

CONSUMER PRODUCT SAFETY COMMISSION

16 CFR Part 1500 and Part 1507

Large Multiple-Tube Fireworks Devices; Final Rule

AGENCY: Consumer Product Safety Commission.

ACTION: Final rule.

SUMMARY: The Commission is amending its fireworks regulations under the Federal Hazardous Substances Act. This final rule will require that large multiple-tube fireworks devices that have any tube with an inner diameter of 1.5 inches (3.8 cm) or greater pass a performance test for stability. Under the test, these devices may not tip over when inclined at an angle of 60 degrees from the horizontal. This requirement is intended to reduce the risk of injury posed when these fireworks devices tip over during firing. If they tip over, subsequent tubes may discharge in the direction of spectators or others in the vicinity.

DATES: The rule will take effect on March 26, 1997, and will apply to multiple-tube fireworks devices in which any tube has an inner diameter of 1.5 inches or greater and that first enter interstate commerce or are imported on or after that date.

Adversely affected persons have until April 25, 1996 to file objections to this rule, stating grounds therefor and requesting a public hearing on those objections. Objections and requests for hearings must be mailed to the Office of the Secretary, Consumer Product Safety Commission, Washington, D.C. 20207, or delivered to the Office of the Secretary, Room 502, 4330 East-West Highway, Bethesda, Maryland 20814 telephone (301) 504-6800.

FOR FURTHER INFORMATION CONTACT: Samuel B. Hall, Office of Compliance, Consumer Product Safety Commission, Washington, DC 20207-0001; telephone (301) 504-0400, ext. 1371.

SUPPLEMENTARY INFORMATION:

A. Background

Multiple-tube mine and shell fireworks devices (also called "display racks" and referred to in this notice as "multiple-tube devices") are non-reloadable devices that fire multiple aerial shells, comets, or other effects into the air to produce visual and audible effects. These devices consist of several vertical tubes with a common fuse, either with or without a horizontal base. They are classified by the Department of Transportation ("DOT") as 1.4G explosive devices (formerly Class C common fireworks devices) which are suitable for use by consumers.

The devices are designed to fire sequentially. This creates the danger that the device's reaction to one shot may cause it to tip over. Subsequent shots may then fire horizontally or at an angle and hit the operator or spectators. The Commission is aware of two deaths to spectators involving multiple-tube devices that occurred in this manner. Both of these incidents involved devices with tubes larger than 1.5 inches in diameter.

The Commission regulates fireworks devices under the Federal Hazardous Substances Act ("FHSA"). 15 U.S.C. 1261-1278. Under its current regulations, the Commission has declared certain fireworks devices to be "banned hazardous substances." 16 CFR 1500.17(a) (3), (8) and (9). Other fireworks devices must meet specific requirements to avoid being classified as banned hazardous substances. 16 CFR Part 1507. Commission regulations also prescribe specific warnings required on various legal fireworks devices, 16 CFR 1500.14(b)(7), and designate the size and location of these warnings. 16 CFR 1500.121.

On July 1, 1994, the Commission issued an advance notice of proposed rulemaking ("ANPR") discussing the

hazard presented by multiple-tube devices of all sizes, but noted that more severe incidents have occurred with large devices. 59 FR 33928. The ANPR used 1 inch (2.54 cm) as the cutoff between small and large devices. The ANPR explained that the Commission was considering the following regulatory alternatives: (1) ban all multiple-tube devices; (2) ban multiple-tube devices with an inside tube diameter of greater than 1 inch; (3) require additional labeling on all multiple-tube devices; (4) establish performance or design criteria to modify these devices; (5) pursue individual product recalls; and (6) take no mandatory action, but encourage development of a voluntary standard.

On July 5, 1995, the Commission issued a notice of proposed rulemaking ("NPR") in which it proposed a performance standard for multiple-tube devices with any tube inner diameter of 1.5 inches or more. 60 FR 34922. The Commission found that 1.5 inches is a more appropriate measure to distinguish between large and small devices than is 1 inch, and decided not to propose any further regulatory requirements for smaller devices.¹ The proposed performance standard provided that all large multiple-tube devices have a minimum tip angle greater than 60 degrees. With this notice, the Commission issues the performance standard as a final rule.

B. Statutory Authority

This proceeding is conducted under the FHSA. 15 U.S.C. 1261-1278. Fireworks are "hazardous substances" within the meaning of section 2(f)(1)(A) of the FHSA because they are flammable or combustible substances, or generate pressure through decomposition, heat, or other means, and "may cause substantial personal injury or substantial illness during or as a proximate result of any customary or reasonably foreseeable handling or use * * *" 15 U.S.C. 1261(f)(1)(A).

Under section 2(q)(1)(B) of the FHSA, the Commission may classify as a "banned hazardous substance" any hazardous substance intended for

¹ The Commission concluded that additional work would be needed to develop a standard that adequately addressed the tip-over hazard with small (less than 1.5 inch diameter) multiple-tube devices. For example, the Commission would need to test small devices to determine if the 60-degree tip angle is the proper criterion for this size device. Further, smaller devices are likely to produce less force on impact, and may be less likely to cause fatal injuries. Because not many small devices are marketed and the known incidents involve large devices, a performance standard for small multiple-tube devices may not be necessary. Accordingly, the Commission decided to apply the stability criterion only to large devices.

household use which, notwithstanding the precautionary labeling that is or may be required by the FHSA, presents such a hazard that keeping the substance out of interstate commerce is the only adequate way to protect the public health and safety. Id. at 1261(q)(1)(B). A proceeding to classify a substance as a banned hazardous substance under section 2(q)(1) of the FHSA is governed by sections 3(f)-(i) of the FHSA, and by sections 701(e)-(g) of the Federal Food, Drug, and Cosmetic Act ("FDCA"), 21 U.S.C. 371(e)-(g). See 15 U.S.C. 1261(q)(2).

The July 1, 1994, ANPR was the required first step to declare the specified multiple-tube devices to be banned hazardous substances under section 2(q)(1). See 15 U.S.C. 1262(f). The proposed rule, published on July 5, 1995, continued the regulatory process in accordance with 15 U.S.C. 1262(h). To fulfill additional statutory requirements, this notice includes the text of the final rule and a final regulatory analysis. Id. at 1262(i)(1). As required by the FHSA, the Commission also makes findings here that: (1) compliance with any relevant voluntary standard is unlikely to adequately reduce the risk of injury, or substantial compliance by the industry with the voluntary standard is unlikely; (2) the expected benefits of the regulation bear a reasonable relationship to its expected costs; and (3) the regulation imposes the least burdensome requirement that would adequately reduce the risk of injury. Id. at 1262(i)(2).

C. Filing Objections Under Section 701(e) of the FDCA

The procedures established under section 701(e) of the FDCA also govern this rulemaking. 15 U.S.C. 1261(q)(2). These procedures provide that once the Commission issues a final rule, persons who would be adversely affected by the rule have 30 days in which to file objections with the Commission stating the grounds therefor, and to request a public hearing on those objections. 21 U.S.C. 371(e). If objections are filed, a hearing to receive evidence concerning the objections would be held. The presiding officer would then issue an order, based upon substantial evidence. Id. The Commission's procedural rules at 16 CFR Part 1502 would apply to such a hearing.

Any objections and requests for a hearing must be filed with the Commission's Office of the Secretary. They will be accepted for filing if they meet the following conditions: (1) they are submitted within the 30-day period specified; (2) each objection is separately numbered; (3) each objection

specifies with particularity the provision(s) of the regulation to which the objection is directed; (4) each objection on which a hearing is requested specifically requests a hearing; and (5) each objection for which a hearing is requested includes a detailed description of the basis for the objection and the factual information or analysis in support thereof (failure to include this information constitutes a waiver of the right to a hearing on that objection). 16 CFR 1502.6.

The Commission will publish a notice in the Federal Register specifying any parts of the regulation that have been stayed by the filing of proper objections or, if no objections have been filed, stating that fact. Id. at § 1502.7. As soon as practicable, the Commission will review any objections and hearing requests that have been filed to determine whether the regulation should be modified or revoked, and whether a hearing is justified. Id. at § 1502.8.

D. The Product

As explained in the proposed rule, this rulemaking only applies to multiple-tube devices that have any tube equal to or greater than 1.5 inches in inner diameter (referred to below as "large devices"). Large devices were first introduced by domestic manufacturers around 1986. Generally, they consist of three or more tubes grouped together, sometimes on a wooden base, and fused in a series to fire sequentially. Bases, where used, come in a variety of sizes. The devices fire aerial shells, comets, or other effects from the tubes, producing visual and audible effects. These devices are among the largest fireworks available to consumers. [13]²

The tubes may be individually labeled or have a single label surrounding them. Commission regulations require that all multiple-tube devices display the following conspicuous label:

Warning (or Caution) Emits Showers of Sparks (or Shoots Flaming Balls, if More Descriptive)

Use only under [close] adult supervision.³
For outdoor use only.

Place on a hard smooth surface (or place upright on level ground, if more descriptive).

Do not hold in hand.
Light fuse and get away.

16 CFR 1500.14(b)(7)(ix).

The National Fireworks Association ("NFA") reports that retail sales of large multiple-tube devices are between \$24

² Numbers in brackets refer to documents listed at the end of this notice.

³ The word "close" is optional.

and \$36 million annually, with an estimated 400,000 to 700,000 units sold per year. Prices range from \$30 to \$130 per unit, with most devices in the \$50 to \$60 range. The NFA also reports that domestic devices account for about 75 percent of the market by dollar volume and somewhat less by unit sales. Imported devices are manufactured primarily in China, and go through several wholesalers before reaching the retail vendor. [13] Some devices have tubes that are imported from China and then are inserted into larger tubes and assembled with bases in the United States. CPSC considers such devices to be imported.

E. Risk of Injury

The devices fire sequentially, and under some conditions the force from one shot can tip the device over, causing it to fall into a horizontal position. A subsequent shot can discharge as the device is falling or when it is horizontal. When this occurs, there is a risk that one of the projectiles may strike the operator of the device or spectators and cause serious injury, or even death.

The Commission is aware of two deaths involving large multiple-tube devices. In both incidents, the device tipped over while functioning. A projectile then fired horizontally from the device and struck the victim. In each case, the victim was a spectator.

The first fatality occurred in July of 1991. A 3-year-old boy was standing between his father's legs approximately 40 feet from an area where fireworks were being set off at a family reunion. The device had been placed on concrete blocks. The device tipped over after the third shot, and the fourth shell fired horizontally in the direction of the boy, striking him in the left ear. He died the next morning. [2, Tab A]

The second fatality occurred in July of 1992. The victim, a 65-year-old grandmother, was sitting at the end of a picnic table watching a family fireworks display approximately 40 feet away. Her son placed a large multiple-tube device on a piece of wafer board

that extended about one foot over the end of a boat dock. He placed a 2x4 block of wood under the end of the board so that the device would shoot out over the lake. After lighting the device, he walked toward the shore and noticed that the device had tipped over after the third shot. The fourth shell discharged horizontally and struck his mother in the temple and eye. She died the next morning. [2, Tab A]

CPSC's compliance testing indicates that the tip-over risk evidenced by these two incidents continues to exist. In fiscal year 1994, all 24 samples of imported devices tested for the Commission's routine compliance program, and 1 of 8 samples of domestic devices, tipped over while functioning. In fiscal year 1995, 22 of 27 imported samples and 1 of 5 domestic samples tipped over. [19]

F. Commission Tests to Develop a Standard

1. Testing Prior to the ANPR

After the first fatality, several domestic manufacturers of large multiple-tube devices began developing a test for the potential of these devices to tip over while functioning. The test used a 2-inch (5 cm) thick block of medium-density (2 pounds per cubic foot or 0.032g/cm³) polyurethane upholstery foam to simulate uneven surfaces. When placed on this surface, if a device tipped over while functioning, it was deemed too unstable.

The American Fireworks Standards Laboratory ("AFSL") then began work to revise its standard for these devices to incorporate such a dynamic stability test. AFSL issued an interim revised voluntary standard in January 1993 and adopted it without changes on September 5, 1995. The Commission also collected samples of large multiple-tube devices and tested them for tip-over using the industry's dynamic stability test. [1 and 14]

2. CPSC's Dynamic Stability Testing

After issuing the ANPR, the Commission staff attempted to develop

a dynamic stability test that could provide a reliable performance standard for multiple-tube devices. The staff's objective was to develop a test that could reliably distinguish between large multiple-tube devices that are dangerously unstable and those that do not present an unreasonable tip-over risk. The staff attempted to identify a test surface that would simulate grass (the surface believed to be commonly used for fireworks displays), and that would produce consistent results in repeated tests.

To accomplish this goal, the Commission had to identify a surface on which the devices would consistently tip over or remain upright in a manner corresponding to how the devices perform on grass. If the tip-over rate was substantially greater on the test surface than on grass, the standard might be too stringent, causing unnecessary changes to reasonably safe products. If the tip-over rate was substantially lower on the test surface than on grass, the standard might not adequately protect consumers.

As explained in detail in the Federal Register notice that published the proposed rule, the staff's testing did not yield sufficiently reliable results to propose a dynamic standard. 60 FR 34922, 34924. The staff tested devices on several types of foam. First it tested with 2-inch thick foams of three different densities. This thickness was chosen, in part, because the AFSL standard specifies 2-inch thick medium-density foam. However, the tip-over rates with all three densities of two-inch thick foam in this initial test were significantly greater than with grass (39 to 50 tip-overs out of 50 devices on foam compared with 4 out of 50 on grass). The staff then tested three high-density foams of smaller thicknesses (0.75, 1.0, and 1.5 inches), hoping to better match the tip-over rates on grass. [6, 8] However, none of the these three foams agreed consistently with grass for all three devices tested. The results of this phase of testing are summarized in Table 1.

TABLE 1.—PHASE I—INCIDENCE AND PERCENTAGE OF TIP-OVER WITH LARGE MULTIPLE-TUBE DEVICES ON GRASS OR HIGH DENSITY POLYURETHANE UPHOLSTERY FOAM

Device	Grass	Polyurethane foam		
		0.75 inch	1.0 inch	1.5 inch
1	4/50 8%	4/50 8%	14/50* 28%	40/50* 80%
2 ^a	32/50 64%	9/50* 18%	25/50 50%	43/50* 86%
3 ^a	27/50	2/50* 4%	3/50* 6%	7/50* 14%

TABLE 1.—PHASE I—INCIDENCE AND PERCENTAGE OF TIP-OVER WITH LARGE MULTIPLE-TUBE DEVICES ON GRASS OR HIGH DENSITY POLYURETHANE UPHOLSTERY FOAM—Continued

Device	Grass	Polyurethane foam		
		0.75 inch	1.0 inch	1.5 inch
	54%	4%	6%	14%

* Significantly different from grass, P<0.05.
^a Device modified to increase tip-over rate.

Of the three foams, 1-inch foam appeared to offer the best overall relationship to grass, even though it produced inconsistent results. [6, 8] Therefore, the staff continued testing with this foam.

In phase II of the Commission's testing, six additional devices were tested on grass and on 1.0-inch thick high density foam. The results were then combined with the results from phase I. Once again, however, there was not consistent agreement between the tip-over rates on foam and on grass (see Table 2).

TABLE 2.—PHASE II—INCIDENCE AND PERCENTAGE OF TIP-OVER WITH LARGE MULTIPLE-TUBE DEVICES ON GRASS OR 1.0-INCH HIGH DENSITY POLYURETHANE UPHOLSTERY FOAM

Device	Grass	Foam
1 ^a	4/50 8%	14/50* 28%
2 ^b	32/50 64%	25/50 50%
3 ^b	27/50 54%	3/50* 6%
4 ^b	30/50 60%	36/50 72%
5	0/90 0%	0/50 0%
6 ^a	10/50 20%	25/50* 50%
7	0/50 0%	0/50 0%
8	0/90 0%	0/50 0%
9	0/50 0%	0/50 0%

* Significantly different from grass, P<0.05.
^a Device has no base.
^b Device modified to increase tip-over rate.

The staff concluded that the dynamic stability test it attempted to develop could not reasonably form the basis for a standard addressing the tip-over hazard with large multiple-tube devices. Particularly problematic was the dynamic test's inconsistency. There were two cases (devices 1 and 6) in which foam significantly overpredicted the tip-over rate with grass. In another case (device 3) foam significantly underpredicted the tip-over rate with

grass. [6, 8] These tests showed a highly significant "interaction" between the device and test surface, so that one could not accurately predict, based on a device's performance on foam, how the device would behave on grass. An accurate test is needed to avoid unwarranted market disruption and, more importantly, because a tip-over can lead to a fatality.

3. The Tip-Angle Test

Since the Commission's testing on foam did not yield a reliable dynamic test, the staff looked to the physical properties of large multiple-tube devices to develop a static test. The staff measured the dimensions, mass, and static tip-over resistance ("tip angle") of all the devices tested. The angle at which a device will first tip over depends on its base-height ratio, mass, and center of gravity. A device's dynamic stability—its ability to remain upright when fired—depends on its tip angle and other factors, such as its lift force, the firing order, and the time between firings. The staff found that tip angle could predict whether a device would tip over while functioning and also be sufficiently sensitive for routine compliance testing. [9]

The staff measured the tip angle of devices by placing one edge of the device against a mechanical stop approximately 1/16-inch high (to prevent sliding) at the edge of a horizontal hinged platform. The platform was slowly raised from the horizontal until the device tipped over. The tip angle was considered to be the angle at which the device first tips over. The staff repeated the test for each edge of the device to determine its minimum tip angle. In this manner, the staff measured the tip angle for the nine large devices used in the dynamic tests. The staff then compared these measurements and the results of the dynamic tests to determine whether there was a relationship between the minimum tip angle of a device and its dynamic stability on grass (see Table 3). [9]

TABLE 3.—STATIC TIP-OVER RESISTANCE AND DYNAMIC TIP-OVER RATE OF LARGE MULTIPLE-TUBE DEVICES

Minimum tip angle (degrees)	Tip-over rate on grass		Device
	Percent	Incidence	
35, 42 ^b	54	27/50	3 ^a
37	64	32/50	2 ^a
37	20	10/50	6
37	8	4/50	1
40	60	30/50	4 ^a
61	0	0/90	5
64	0	0/50	7
65	2.5	1/40	4
68	0	0/40	2
69	0	0/50	9
70	0	0/40	3
78, 80 ^b	0	0/90	8

^a Device modified to increase tip-over rate.
^b Different samples of same device.

The staff also tested several large devices other than those it had examined when considering a dynamic test. One device was a modified form of device 1, that originally had no base. The staff glued a 12-inch (30.5-cm) square particleboard base to the device. With this modification, the tip angle increased from 37 degrees to 68 degrees. The tip-over incidence on grass also decreased, from 4/50 to 0/50. This additional test demonstrates that a device's stability can be improved by adding a base. [9]

The second additional device that the staff tested, an imported one, had a square plastic base. The tip angle of this device ranged from 54 to 55 degrees (based on measurements of four individual samples), and it did not tip over in 50 dynamic tests on grass. [16]⁴

None of the seven devices originally tested had tip angles between 43 and 61 degrees. Therefore, the staff modified the base of a device that had a large particleboard base in order to obtain a tip angle near 50 degrees. The staff

⁴ The staff had previously tested this type of device (tip angle: 52–55 degrees and tip-over rate: 2/40), but the bases of some of the devices in the earlier test were cracked. Therefore, the Commission does not consider the earlier tests to be reliable and has not considered them in determining an appropriate tip angle. [10 and 11]

trimmed 2¹/₁₆ inches off each of the two long edges of the base. The minimum tip angle of the device then ranged from 50 to 51 degrees (based on

measurements of eight individual samples). This modified device tipped over in 33 out of 51 tests on grass. [16] Table 4 shows the tip angles and tip-

over rates of the three additional devices that the staff tested.

TABLE 4.—STATIC TIP-OVER RESISTANCE AND DYNAMIC TIP-OVER RATE OF ADDITIONAL LARGE MULTIPLE-TUBE DEVICES ^a

Minimum tip angle (degrees)	Tip-over rate on grass		Description of device
	Percent	Incidence	
50–51 ^b	65	33/51	Four-tube device with base. Base trimmed to obtain 50 degree tip angle.
54–55 ^b	0	0/50	Seven-tube device with plastic base.
68	0	0/50	Seven-tube device. Same as device 1, but with added 12 inch base.

^a Does not include devices that the staff considered to present inconclusive results.

^bRange of values for replicate samples.

The Commission proposed and now issues in final a standard requiring that large multiple-tube devices must have a minimum tip angle above 60 degrees. The Commission's data indicate that substantially all of the devices measuring a tip angle above 60 degrees did not tip over while functioning on grass. Among such devices, there was only one tip-over in 450 tests. On the other hand, devices with tip angles below 60 degrees had tip-over rates on grass as high as 65 percent. Among all devices tested with tip angles below 60 degrees, there were 136 tipovers in 351 tests.

The Commission believes that requiring devices to have minimum tip angles above 60 degrees offers an appropriate margin of safety. The fact that the staff observed no tip-overs with one device that had a tip angle of 54–55 degrees might appear to suggest that a tip angle of 54 degrees would be sufficient to protect against the tip-over hazard. However, a device that had a tip angle of 50–51 degrees had a very high incidence of tip-overs (33/51). This device had a small base, and would have been even less stable if, like a number of other devices on the market, it had no base extending outward from the tube configuration. Thus, it is likely that some devices with 55-degree tip angles would tip over when tested on grass. Furthermore, the tests were performed on level ground, and in actual use there probably will be significant variations from level in a number of cases. The Commission concludes that in order to adequately protect the public, it is appropriate to require that the minimum tip angle be above 60 degrees.

AFSL submitted comments on the NPR that included results from its testing of 43 units (13 different devices). AFSL reported that 35 percent of the units it tested met a 60-degree tip-angle test and that none of the devices it

tested tipped in actual firing. As explained below in Section G of this notice, this limited testing does not show that a requirement for a tip angle above 60 degrees is too stringent a measure of whether a multiple-tube device is unlikely to tip over in use.

G. Comments Responding to the Proposed Rule

The Commission received eight comments in response to the proposed rule. Some commenters stated that they support the proposed rule. Significant issues raised by other comments, and the Commission's responses, are summarized below.

1. Scope of the Rule

AFSL stated that it agreed with the Commission's decision to limit the scope of the proposed rule to large multiple-tube devices and that the Commission was correct in concluding that devices with inside diameters greater than 1 inch, but less than 1.5 inches, are not common.

2. Need for a Rule

Some commenters stated that the need for a rule had not been demonstrated because the number of reported injuries is low or because the injuries are caused by consumer misuse. As explained below, the Commission disagrees with these contentions.

a. Injury Data

Comments: One commenter claimed that the number of multiple-tube devices has increased, but that the number of injuries associated with them has not. The commenter concludes that the small number of injuries and deaths associated with multiple-tube devices or Class C fireworks does not justify further regulation. This commenter also claimed that multiple-tube fireworks devices are no different from other fireworks with respect to the potential for injury.

One group of commenters stated that in their evaluation of injuries recorded in the state of Indiana, multiple-tube devices and other consumer fireworks either have not tipped over or have caused few or no injuries.

Response: Mine and shell devices (both single and multiple shot) are more powerful than most consumer fireworks. Although the number of deaths and injuries associated with mine and shell devices is relatively low, the severity of injuries is greater than with other devices. Any tip-over of large multiple-tube devices has the potential to cause death or serious injury. Two individuals are known to have been struck by large multiple-tube devices. Both suffered fatal injuries.

The yearly unit sales figures for fireworks are unknown. Therefore, the Commission cannot accurately assess any possible trends in exposure to large multiple-tube devices. However, the cases show that the potential for tip-over and serious injury or death is high under certain conditions of foreseeable use. Since, as explained below, there is no voluntary standard that can adequately reduce this risk, the mandatory standard proposed by the Commission is necessary.

Comment: The commenters on the Indiana data also requested that the Commission survey dealers to inquire about reported cases or instances of a problem with a multiple-tube mine and shell device.

Response: As noted above, a mandatory standard is appropriate despite the low number of reported deaths and injuries. In view of this, there is no need to perform the requested survey.

Comment: AFSL contends that the lack of any known serious injury attributed to large multiple-tube devices since the adoption of the AFSL standard in 1993 supports their view that the voluntary standard is adequate.

Response: These devices had been on the market for 6 years by the time the two known deaths occurred. Thus, the absence of any known deaths since 1993 is not statistically significant. The adequacy of AFSL's standard, and the extent to which it is adopted by industry, are discussed below under the responses to comments favoring a dynamic test and to comments favoring the alternative of a voluntary standard.

b. Possible Role of Misuse and Alcohol in Tip-Over Incidents

Comment: One commenter alleged that any increase in mortality related to these items is the direct result of misuse and the failure of consumers to follow the appropriate instructions. The same commenter stated that the fireworks industry cannot be held accountable for all injuries, particularly when the item is being blatantly misused. The commenter also claimed that many fireworks-related injuries involve some level of intoxication by the operator and that the correlation between alcohol use and injury should be considered in the hazard analysis for any product.

Response: The incident reports do not indicate that the fatalities involving large multiple-tube devices were a result of misuse. Rather, they appear to have occurred during reasonably foreseeable use of the product. The two fatalities occurred during family gatherings a day or two after the July 4th holiday.

The labels on multiple-tube devices generally state that the device should be placed on a solid level surface prior to firing. In one fatality, concrete blocks were stacked in the yard as a staging area. In the other fatality, the fireworks device had been placed on a board so that it would fire over a lake. The use of the devices on either of these surfaces appears to indicate concern with the appropriate placement of the fireworks device prior to firing.

Thus, the known cases involving fatalities support the conclusion that the users were attempting to follow the instructions for proper placement of the devices. In addition, there is no indication that alcohol was a factor in either of the deaths. Accordingly, the Commission disagrees with the commenter's contention that consumer misuse or intoxication was the cause of these accidents.

Comment: One commenter claimed that, based on a 1992 CPSC study of hospital emergency-room-treated injuries, "a major problem with fireworks injuries were the result of consumer misuse."

Response: The study cited does not support this proposition for the devices at issue here. In discussing the category

of Shells and Mines (the major two types of devices included in the this rulemaking), the report states that "little can be said to characterize this category of fireworks due to the small sample size (five investigations). However, it appeared that the flight path of the projectile, particularly when tip-over was involved, may be a major concern." [23]

There may well have been misuse of the multiple shell devices associated with some of the injuries in the study. However, nothing in the report indicated that the injuries could be attributed to any such misuse, as opposed to erratic flight path, tip-over, or other problems with the devices.

c. Section 15 of the CPSA

Comment: One commenter stated that the proposed rule is unnecessary because existing regulations and section 15 of the Consumer Product Safety Act ("CPSA") are adequate. 15 U.S.C. 2064. Section 15 authorizes the Commission to take corrective actions regarding product defects that create a substantial risk of injury to the public. See 16 CFR 1115.4, 1115.12 (e) and (g).

Response: Existing fireworks regulations require only a base-to-height ratio of at least 1:3. 16 CFR 1507.4. All the devices tested by CPSC that tipped over during actual use complied with this standard. Therefore, this requirement does not adequately address the tip-over hazard.

In addition, the ongoing problem of numerous section 15 recalls of multiple-tube devices under section 15 of the CPSA due to tip-over indicates that existing regulations are not effective. Under these circumstances, a performance standard that effectively addresses the problem for all devices is more appropriate than case-by-case investigation and recall.

3. Selection of the Tip-Over Angle

Comment: One commenter stated that there is no logical or statistically valid reason for choosing any particular angle as the minimum angle required by the static test.

Response: In developing the proposed rule, the staff considered specifying minimum tip angles as low as 45 degrees. However, as noted above, the Commission concluded that, to provide a margin of safety and to address the likelihood that the devices will not be used on level ground, the static test should require that a device not tip at an angle of 60 degrees.

It is possible that a fireworks device might be constructed that would not tip over in a static test at 60 degrees but would tip over under foreseeable

conditions on grass. In fact, 1 of the 450 devices tested by the Commission with a tip angle over 60 degrees did tip over when tested on grass. Increasing the stringency of the static test to address such hypothetical "outliers" would make the requirement unduly restrictive for the vast majority of designs that are likely to be marketed. If such easy-to-tip designs are marketed in the future, the Commission will consider action under section 15 of CPSA. 15 U.S.C. 2064.

Comment: One commenter suggested a more lenient tilt test for items that do not present as much of a tip-over hazard as other available designs. The commenter stated that a more lenient tilt test was especially appropriate for devices with tubes clustered in the center of the base. The commenter asserted that multiple-tube items with tubes clustered close to the center of the base will more likely fail the static test, but be more stable when tested on foam or grass than multiple-tube items with tubes near the edge of the base. The commenter provided sketches to illustrate this point, and also suggested a formula to determine the tilt angle based on the geometry of the devices relative to the geometry of the base:

$T=45+15(d/b)$, where:

T is the tip angle in degrees; d is the length of the diagonal of a square (or diameter of a circle) enclosing the tubes; and b is the length of the diagonal of a square base or diameter of a circular base.

The commenter stated that preliminary testing supports the formula, but provided no data and admits that further tests are needed.

Response: The staff of the Commission's Engineering Laboratory agrees that there are configurations that could provide greater or lesser stability for a fired multiple-tube device. The commenter lists base size, base thickness, lift charge, and size of the aerial load as relevant factors affecting stability. However, firing order and rate, as well as other variables, also affect the dynamic stability of multiple-tube devices.

The commenter supplied no data on which to evaluate the suggested formula. The Commission has very limited data on the tip-over characteristics of devices with tip angles in the range of 45 to 60 degrees. As explained above, the Commission selected the 60-degree tip angle criterion based on a device with a tip angle of 50 to 51 degrees that tipped over a large proportion of the time (33/51) when tested dynamically on grass. In addition, various combinations of the factors that affect tip-over could cause a device with

a similar configuration to tip over more readily than the tested device. The suggested formula does not account for these other factors—such as load, firing rate, etc. The Commission's criterion does account for these factors by correlating tip angle to dynamic tip-over on grass.

The commenter's formula is intended to be applied to devices with a square or circular base. The device with the 50–51 degree tip angle that had a high tip-over rate had a rectangular base. It is not clear how, if at all, the commenter would apply the formula in this case. However, it can be expected that the formula will produce tip-angle criteria ranging between 50 and 60 degrees, depending on the configuration. Available data do not show that such criteria would provide an adequate margin of safety. Accordingly, the Commission is not adopting this commenter's suggestion.

Comment: As explained above, the Commission selected the 60-degree criterion based on the performance on grass of a large number of tests of various large devices. Some comments questioned the adequacy of this testing. One commenter asked why the Commission did not test the devices that were recalled as a result of failing the 2-inch foam test and the device known to have been involved in the death of a 3-year-old boy. The same commenter suggested that CPSC conduct additional tests comparing the static test to the dynamic test with foam. Another commenter questioned why the Commission did not test a larger sampling of the various multiple-tube devices, including the W-800 inserts with a wooden base and a tube around the insert.

Response: In developing the proposed standard, the Commission selected devices that represented a cross section of the devices available at the time and that provided a range of tip-over rates. The Commission considered design characteristics such as base size, firing order, internal fuse-burn time, lift charge, shell mass, device shape, center of gravity, and quality of materials and construction. This cross-section of devices is sufficient to ensure that the test selected by the Commission is reasonable.

Devices that had been previously recalled—as well as the device involved in the death of the 3-year-old boy—were not available at the time that the CPSC conducted its tests. It is expected that had they been available for testing, they would have been among those devices found to be unstable. However, the Commission believes that it is more reasonable to test currently available

devices, rather than devices that are no longer manufactured or available.

Comment: Some commenters stated that there are devices that are stable in actual use even though they do not comply with the proposed rule. AFSL submitted test data to support this view. These commenters asserted that the proposed rule unfairly penalizes such devices.

Response: As explained above, AFSL presented limited test data on 12 large multiple-tube devices (one device included in AFSL's testing was actually a small device). Seven of these did not meet the 60-degree tip angle, but did not tip over in AFSL's dynamic tests.

AFSL's testing was very limited—only one sample of each device on three surfaces (concrete, 2-inch foam, and grass), and one device was not even tested on grass. A single test is not sufficient to establish the dynamic stability of a device. For example, a device that tips over 1 in 10 times may present a serious risk of injury, but there is only a 1-in-10 chance of observing a tip-over in a single test. In CPSC's tests, the staff tested from 40 to 90 samples of each device. The Commission cannot conclude based on AFSL's limited data that the seven devices it tested are stable when operated on grass.

4. Static v. Dynamic Test

Introduction. As noted above, the Commission's requirement involves inclining the device at an angle of 60 degrees while it is prevented from sliding by a stop on the inclined supporting surface. If the device does not tip over further at that angle, it complies with the requirement. This is a static test; it is affected only by the location of the center of gravity of the device with respect to the edge of the device that is against the stop.

Comments: A number of commenters would prefer a dynamic test, which would involve actually firing the device while it rests on a specified supporting surface to see if the device tips over. The American Pyrotechnic Association ("APA") and AFSL stated that, although they support a requirement for static stability, a static requirement is not sufficient by itself to address the tip-over hazard. These two organizations and other commenters stated that, in addition to a static test, the proposed rule should require dynamic testing, either for all large devices or for those with tip angles between 45 and 60 degrees.

Response: Under the FHSA, manufacturers must consider whether their products pose a hazard during "reasonably foreseeable handling and use." The Commission considers

operation of multiple-tube devices on grass to be "reasonably foreseeable." Further, the resilient and variable nature of grass makes it more likely that a device will tip over when fired from a grass surface than from other common supporting surfaces, such as dirt or pavement. Thus, an adequate test should address the hazard of tip-over of these devices when fired while sitting on grass as well as on more forgiving surfaces.

A substantial problem with dynamic testing of these devices is that grass is not a reproducible test surface. Even patches of grass that appear to be identical can react differently to the forces produced when a device is fired.

Foams of various characteristics have been suggested as suitable test surfaces for determining whether a device will tip over when fired. AFSL uses 2-inch thick medium-density foam in its tip-over testing.

The staff considered whether foam is an adequate surrogate for grass—that is, whether there is a consistent relationship between the tip-over behaviors on grass and foam for a variety of devices. Based on the CPSC's tests, however, there was no consistent relationship between the tip-over rates measured on grass and foam. In fact, the tests suggested that there may be cases where devices that do not tip over when tested on foam may tip over frequently on grass.

The Commission concludes that, because of the absence of any suitable test surface, the use of dynamic testing for devices, regardless of their tip angle, is not presently feasible. However, the results of any voluntary dynamic tests by industry may provide valuable information when considered in conjunction with a device's tip angle. And, as explained above, the Commission will examine whether devices that tip over when fired despite passing the 60-degree tip-angle test present a substantial product hazard under section 15 of the CPSA.

5. Dynamic Variations in Tip-Over Potential

Comment: One commenter noted that the potential for tip-over from multiple-tube mine and shell devices is not equal among all of the various shapes, sizes, and configurations of devices.

Response: The Commission agrees that the potential for dynamic tip-over from multiple-tube fireworks devices can differ among the various shapes, sizes, and configurations of devices with the same static tip angle. For example, devices that have larger or heavier bases or smaller lift (propellant) charges are less likely to tip over. Nevertheless, for

the reasons explained above, the 60-degree tip-angle test is the best means available to determine whether a multiple-tube device is unreasonably likely to tip over when fired.

Comments on specific factors that may affect tip-over potential are discussed below.

Comment: One commenter stated that the rate of firing of the projectiles from the tubes can affect dynamic stability and that this should be examined.

Response: The Commission agrees that the rate of firing—the time between the firing of individual tubes—may affect the dynamic stability of multiple devices. A multiple-tube device can become less stable as a result of rapid sequential tube firings. In compliance testing, the Commission considers whether the firing rate may contribute to tip-over. The staff has discussed with AFSL the possibility of incorporating into their standard a minimum time between the firing of successive tubes. However, the rate of firing is only one of many variables that affect the dynamic stability of multiple-tube devices. The 60-degree tip-angle test requirement, which takes into account several factors, is the best known way to address the tip-over hazard.

Comment: Several commenters stated that, in addition to the static test, the proposed rule should limit the lift charge—i.e., the propellant powder weight—to 12 grams per tube. AFSL presented test data showing that increasing the lift charge above the 12-gram limit may decrease the dynamic stability of multiple-tube devices. A specially made device (not commercially available), with 20 grams of lift charge per tube, tipped over in one test on 2-inch foam. A similar device with 12 grams of lift charge did not tip over in one test on foam. Another specially-made device did not tip over in one test on foam, even though the lift charge was increased to 20 grams.

Several commenters asked why the CPSC did not study the effects on stability of the amount of lift charge in devices.

Response: U.S. Department of Transportation (“DOT”) regulations permit a maximum of 20 grams of lift charge per tube. The AFSL voluntary standard limits the lift charge to 12 grams per tube. The proposed rule did not separately address lift charge. The DOT mandatory 20-gram upper limit and AFSL voluntary 12-gram upper limit are unaffected by this rulemaking.

The staff measured the lift charge in all the devices that were tested. The lift charges in the two devices that tipped over on grass (before they were

modified) were 3.6 and 4.7 grams per tube. The lift charges in devices that did not tip over ranged from 4.7 to 11.6 grams per tube. [6] These results do not support limiting the lift charge. Devices with a lift charge greater than 12 grams per tube were not available to the staff.

The lift charge is only one of the variables that affect dynamic stability. Other variables include firing order, firing rate, weight, the configuration of the tubes, and base dimensions. Further, the lift force (or propellant force)—rather than the lift charge—relates more directly to dynamic stability. The lift force depends on factors in addition to the lift charge, such as the type of powder and the design of the product. Again, the staff’s data show that the dynamic performance of the device is better predicted by a static test.

It may be possible to construct a device that will tip over in actual use, even though it passes the 60-degree static stability test. AFSL’s tests suggest this may be the case. But, the small number of tests conducted by AFSL (two devices, one test each) and the mixed results it reported (one device with 20 grams of lift powder tipped over on foam while another did not) are not adequate to support a mandatory 12-gram limit on the lift charge.

Manufacturers, importers, and distributors must see that their products do not pose a substantial product hazard. Increasing the lift charge might increase the tendency of multiple-tube devices to tip over during operation. Devices developed in the future that exceed 12 grams of lift charge will be tested by the Commission. Any device that tips over while functioning, even though it complies with the static test, may present a substantial product hazard. As explained above, the Commission may take enforcement action in such a case under section 15 of the CPSA. Thus, although the Commission lacks data to warrant a mandatory limit at this time, the Commission encourages manufacturers and importers to continue compliance with the voluntary limit of 12 grams of lift charge per tube since the amount of lift charge may affect tip-over.

6. Other Advantages of a Static Test

Comment: The AFSL and the APA stated that they favor a static test, as in the proposed standard, because it is safer to perform than dynamic testing. One commenter stated that it appears that the Commission proposed a standard based on a static test, in part, because it is easier to perform than dynamic testing.

Response: The Commission proposed a mandatory standard based on the

static test because it adequately addresses the hazard and a suitable dynamic test is not available. That the static test is easier and safer to perform are additional advantages.

7. Other Alternatives to the Proposed Rule

a. Additional Labeling

Comment: One commenter suggested requiring the warning label on multiple-tube devices to include a phrase such as, “PLACE UPRIGHT ON HARD, SMOOTH LEVEL SURFACE BEFORE IGNITING. DO NOT FIRE ON GRASS OR OTHER UNSTABLE SURFACE.”

Response: The Commission’s current labeling requirement for mine and shell devices includes the following statement: “Place on hard smooth surface (or place upright on level ground, if more descriptive).” 16 CFR 1500.14(a)(7)(ix). Except for the admonition not to fire on grass, the commenter’s suggested label is equivalent to the Commission’s current requirement. As to the statement “do not fire on grass,” it is likely that users will place these devices on whatever surface is at the desired location, including grass. Thus, the Commission cannot conclude that there would be significant safety benefits from a label advising against use on grass. Furthermore, the longer label statement suggested by this commenter could reduce the extent to which the basic message is noticed and read by users. Although the Commission lacks the evidence to mandate the “do not fire on grass” statement, and questions its effectiveness, the Commission would not object if manufacturers voluntarily supply such a statement after the required label.

In addressing a product hazard, the most effective approach is to design the hazard out of the product. A warning does not remove the hazard; it only informs the consumer of the hazard. Some users may read and follow the information on a warning label. However, fireworks are frequently used at night when it is too dark for the user to read a warning label. Fireworks also are often used at a party or celebration in which users are unlikely to take the time to read and follow warning labels. And, spectators, like the two victims killed by multiple-tube devices that tipped over, probably will not have an opportunity to read the label.

Even if consumers read and follow a warning label, the device may tip over. In the two death incidents, the fireworks devices were placed on hard, smooth surfaces and they still tipped over. The Commission believes that the proposed

tip-over performance requirement for multiple-tube devices will result in less hazardous multiple-tube devices.

b. Defer to AFSL's Voluntary Standard

i. Adequacy of the Voluntary Standard

Comments: Several commenters supported AFSL's voluntary standard. One group of commenters stated that they would prefer that the Commission allow the industry to adopt a voluntary standard, rather than issue a mandatory standard. Specifically, one commenter referred to AFSL's standard—i.e., the 2-inch foam test—and asserted that foam is a standard, reproducible test surface, even though it is not an adequate surrogate for grass. Another commenter questioned CPSC's conclusion that the AFSL standard did not adequately address the tip-over hazard. AFSL commented that the foam test is intended to simulate a worst-case scenario and that, even though the foam test may not be suitable for a mandatory standard, it adequately addresses the tip-over hazard.

Response: AFSL's foam test has many substantial shortcomings. AFSL does not specify the properties of the foam—such as compressibility, resiliency, and density—that are essential for a reproducible test.⁵ Neither does AFSL specify the environmental conditions, such as temperature and wind speed, that may affect the test results, or the number of devices to be tested. All of these parameters must be specified before the foam test could be considered a standard, reproducible test. And, perhaps most significantly, there is simply no evidence of a consistent relationship between tip-over rates on grass and foam. Thus, a test on foam would not be appropriate even if all the test parameters were specified.

AFSL has never released test results showing that 2-inch foam is a worst-case surface compared to grass. CPSC has only limited data from tests of devices on both 2-inch foam and grass. The Commission's initial tests showed that the 3 different densities of 2-inch foam tested had considerably higher tip-over rates than did grass.

The more extensive tests that the Commission performed on other thickness of foam show that, depending on the device tested, the tip-over rate on foam may be greater than, equal to, or less than that on grass. Furthermore, the Commission's compliance testing in 1995 showed a domestic device that tipped over on grass (1 of 5 tested), but not on 2-inch medium-density foam.

Therefore, the Commission concludes that the currently available information does not support the conclusion that 2-inch foam (or foam in other thicknesses) is a worst-case test surface that is consistently more stringent than grass.

As regards tip angle, the AFSL standard requires a tip angle of only 18 degrees, whereas CPSC tests show that a tip angle of 60 degrees is needed to reasonably prevent tip-over. The Commission concludes that the AFSL standard's tip-angle provision does not adequately address the tip-over hazard with large multiple-tube fireworks devices.

ii. Likelihood of Compliance With the Voluntary Standard

Comment: AFSL commented that a domestic testing program to allow manufacturers to obtain certification for their products has not been established and that the decision to follow the voluntary standard rests solely with individual manufacturers. However, AFSL states that its recent testing of large multiple-tube mine and shell devices indicated that products received from known manufacturers "appeared to comply with the stability provisions of the AFSL standard." According to AFSL, under its China-based testing and certification program, all large multiple-tube mine and shell devices (with tubes larger than 1" inside diameter) from participating firms are tested for compliance with the voluntary standard. Any devices that fail to comply are "withheld from shipment to the participating U.S. importer."

Response: Even if using 2-inch thick medium-density foam were effective, the Commission concludes that AFSL's voluntary standard would not adequately reduce the risk of tip-over because it is unlikely that there will be substantial industry compliance with that standard.

The AFSL standard was adopted in January 1993. However, the results of CPSC's compliance testing indicate that these devices still tip over. In fiscal year 1994, all 24 imported devices tested by CPSC, and 1 of 8 domestic devices, tipped over on either grass or 2-inch thick medium density foam. Of the 32 devices tested on the foam, 25 tipped over, and 4 of these also tipped over when tested on grass. In fiscal year 1995, 22 of 27 imported devices and 1 of 5 domestic devices tipped over. Of the 32 devices tested that year on 2-inch medium-density foam, 21 tipped over, and 10 tipped over when tested on grass. If there were substantial compliance with the AFSL standard, these high rates of tip-over on foam would not likely occur.

There is no information to support a conclusion that the rates of compliance with the AFSL standard will improve. The Commission concludes, therefore, that there will not likely be substantial compliance with the AFSL standard.

c. A Ban of Large Devices

The Commission also considered whether large multiple-tube devices should be banned entirely.

Comment: The National Fire Protection Association ("NFPA") generally has taken the position that fireworks should be used only by licensed professionals. However, in this case, NFPA agreed with the Commission's conclusion that limiting multiple-tube devices to professionals would not eliminate the tip-over hazard. Some commenters stated that the performance standard is preferable to a total ban of large devices.

Response: The Commission agrees that a performance standard is the most appropriate option in this case.

8. Effective Date

Comment: One commenter stated that manufacturers need 1 year to redesign devices, use up current inventory, order new packaging, and obtain Department of Transportation ("DOT") approval for that packaging.

Response: The Commission proposed an effective date of 6 months after publication of a final rule. The rule will apply only to devices first introduced into commerce or imported on or after that date. The vast majority of fireworks are ordered by dealers from July to December and delivered from December to June. The Commission expects that most of the devices currently not complying with the standard can be modified to meet it—e.g., by adding a base. Consequently, any devices still in manufacturers' or importers' inventories on the effective date would not be rendered useless.

According to the DOT official responsible for enforcing regulations on new packaging, it may take 6 to 12 months for firms to obtain DOT approval of changes to the devices, order new packaging, and obtain DOT approval for that packaging. Larger firms are likely to be the ones that will need the full 12-month period, due to the larger number of models that could be affected.

Therefore, a number of firms will need an effective date that is longer than the proposed date of 6 months, and up to 12 months, following publication of the final rule in the Federal Register. Accordingly, the Commission is extending the effective date to 12 months following publication. The final

⁵ Although AFSL specifies medium-density foam, the definition of "medium" may differ among foam suppliers.

rule will thus become effective March 26, 1997.

As noted previously, fireworks deliveries are concentrated in the period December through June. The effective date falls within that period. Therefore, it is likely that some but not all large multiple-tube devices sold at retail for the 1997 summer season will comply with the tip-angle requirement.

9. The Costs of the Regulation

a. Portion of Existing Large Devices To Be Changed by the Rule

Comment: AFSL presented test data with large multiple-tube mine and shell devices from what it claims are all five domestic manufacturers.⁶ Based on these tests, AFSL claimed that only 35 percent of domestic devices complied with the proposed rule (60-degree tilt test), although all were stable in dynamic testing. The Commission's preliminary regulatory analysis assumed that almost all domestic devices would comply with the proposed rule.

Response: AFSL's results contrast with CPSC staff's tests, in which all domestic large multiple-tube devices met the proposed 60-degree tip-angle test. Several aspects of AFSL's testing lead the Commission to question AFSL's conclusions about the anticipated level of compliance with the 60-degree tip-angle test.

AFSL presented test results for 13 models of multiple-tube mine and shell devices. Device number 7 had an inside tube diameter of only 1.25 inches, and is not subject to the rule (which applies only to devices with tube inner diameters measuring 1.5 inches or more). The devices numbered 1, 2, 3, 12, and 13 are essentially imported devices or "inserts" to which wooden bases have been added. Based on AFSL's test data, 5 of 7 (71 percent) large domestic multiple-tube devices will satisfy the rule. The only two domestic devices tested by AFSL that would fail to comply with the rule are devices 8 and 11, since their tip angles were about 57 degrees. Both are new devices that were not available at the time that the CPSC tests were conducted. Combining AFSL's test data with CPSC's, 11 of 13 (85 percent) of large domestic multiple-tube devices would comply with the rule.⁷ Therefore, the Commission disagrees with AFSL's claim that only

35 percent of domestic devices will comply with the proposed rule.

b. Cost of Modifying Noncomplying Devices

Comment: One commenter argued that retail prices of the modified devices would increase by 35 to 45 percent. The commenter did not present any basis for this estimate.

Response: The Commission's cost estimates are based on an average per-unit increase of 25–30 percent. These estimates were provided by the National Fireworks Association (NFA). The NFA is the fireworks trade association with the largest number of members, and the only one with a large contingent of retailers. The NFA estimate is the best one available to the Commission's staff.

10. Environmental Impact

Comment: One commenter stated that there would be a significant environmental impact due to increased rubbish from the larger bases.

Response: The rule is expected to result in modifications to devices representing sales of 100,000-to-175,000 items per year. [21] Consequently, the rule will result in a similar number of larger or new bases, and added packaging, being discarded. Most of these devices are expected to be thrown away after use with other residential trash (as is currently being done). The added costs of disposing of the bases and packaging will be negligible. The environmental impact of disposing of the relatively small amount of additional material required to provide a base, or increase its size, will be negligible. The additional cost to landfills of handling the extra rubbish also will be negligible.

H. The Standard

The Commission is issuing a standard requiring that multiple-tube devices that have any tube measuring 1.5 inches (3.8 cm) or more in inner diameter must have a minimum tip angle greater than 60 degrees. Large multiple-tube devices that do not meet the tip-angle requirement will be banned. The tip angle may be measured by placing the device on a smooth, flat surface inclined at 60 degrees from the horizontal. The device must not tip over at the 60-degree angle when tested at any edge of the device.

An apparatus or "testing block" for testing multiple-tube devices is illustrated in Figure 1 to § 1507.12. The height and width of the inclined plane (not including the portion of the plane below the mechanical stop) must be at least 1 inch (2.54 cm) greater than the largest dimension of the base of the

device to be tested. The test apparatus must be placed on a smooth, hard surface that is horizontal, as determined by a spirit level or equivalent instrument. The mechanical stop must be 1/16 inch (1.6 mm) in height and perpendicular to the inclined plane. The stop must be positioned parallel to the bottom edge of the inclined plane in such a way that no portion of the device to be tested or its base touches the horizontal surface.

Any device that cannot be tested using the apparatus described above, or that presents a tip-over hazard while functioning even though it complies with the static test, may be examined to determine whether it presents a "substantial product hazard" under section 15 of the CPSA. 15 U.S.C. 2064. If the Commission determines that a substantial product hazard exists, appropriate enforcement action may be taken. See 15 U.S.C. 2064.

J. Regulatory Analysis [22]

1. Introduction

The Commission is amending the FHSA fireworks regulations to establish new stability requirements for multiple-tube fireworks devices that have any tube with an inside tube diameter of 1.5 inches or greater. These devices present a tip-over hazard when firing that has resulted in an average of about one death every 3 years over the period for which data are available.

The amendment will reduce the risk of injury and death from tip-overs. Devices that do not remain stable at an angle 60 degrees or below in prescribed tests will be banned hazardous substances under the amendment. It is expected that devices that do not currently pass this test will be able to comply by adding or enlarging a base.

In the Federal Register of July 1, 1994, the Commission issued an ANPR to develop a mandatory requirement to address the tip-over hazard. Although the ANPR addressed both large and small multiple-tube fireworks devices, the notice of proposed rulemaking (NPR) published July 5, 1995, covered only large multiple-tube devices.

To issue this amendment under the FHSA, the Commission is required to publish preliminary and final regulatory analyses containing a discussion of various factors. These factors include a description of the potential benefits and potential costs of the rule, including any benefits and costs that cannot be quantified in monetary terms, and an identification of those most likely to receive the benefits or bear the costs. The FHSA also requires a description of any reasonable alternatives to the rule,

⁶ Although AFSL stated that all the devices tested were "domestically manufactured," some contained imported inserts. CPSC classifies these devices as imports.

⁷ It appears that one device was tested by both AFSL and CPSC. In combining the data, this device was counted only once.

together with a summary description of their costs and benefits, and a brief explanation of why such alternatives were not chosen.

2. Background

Large multiple-tube devices became popular in the mid-1980's. These devices typically consist of three or more tubes fused in a series to fire sequentially; these tubes are grouped together, sometimes on top of a wooden base. The devices are designed to fire aerial shells, comets, or mines producing visual and audible effects from non-reloadable tubes. They are among the largest fireworks available for direct consumer use.

The National Fireworks Association (NFA) reports that retail sales of these devices are between \$24 million and \$36 million annually, with an estimated 400,000 to 700,000 units sold per year. Prices range from \$30 to \$130 per unit, with most devices priced in the \$50-\$60 range. The NFA reports that domestic devices account for about 75 percent of the market by dollar value, and somewhat less by unit sales. There may be hundreds of firms engaged in manufacturing, importing, and distributing these fireworks. Imported devices are primarily manufactured in China, and may go through several wholesalers before reaching the retail vendor.

To comply with the standard, devices that do not have a base would have to add one, and some currently used bases would have to be enlarged. However, consumers are not likely to perceive any significant loss of enjoyment as a result. While some devices may be discontinued, loss of consumer choice would be minimized by the availability of devices that do comply with the standard. Smaller (less than 1.5 inch ID) multiple-tube devices are not covered by the rule and would continue to be available without any change.

3. Regulatory Analysis of the Amendments

a. Potential Benefits. One of the potential risks of injury associated with large multiple-tube fireworks devices results from the tip-over hazard. The Commission's Directorate for Epidemiology and Health Sciences reports two deaths associated with the tip-over hazard from January 1, 1988, through December 1993. This averages to about 1 death every 3 years. The Commission has received no reports of injuries with the product.

The Commission is issuing a performance standard that will require these devices to have a minimum tip angle greater than 60 degrees. According

to the Commission's tests, devices that do not tip over at this angle are not likely to tip while functioning. Thus, the Commission believes that devices meeting this requirement are not likely to fall over while firing, thereby minimizing this risk of death and injury to operators or spectators. The avoidance of these deaths and injuries represents the potential societal benefits of the proposed amendments.

The costs per life saved of this rule are estimated to be between \$4.5 and \$8 million. These costs are within the range of statistical values of life suggested in the recent professional literature. [22] Given that no significant substitution of more hazardous products is expected, no offsetting reduction in these safety benefits is anticipated. To the extent that nonfatal injuries are avoided, the potential benefits would be somewhat higher.

b. Potential Costs. Most devices that already have bases will not have to be modified to meet the amendments. The devices that are not expected to need to be modified are generally manufactured domestically and, according to the NFA, account for at least 75 percent of the retail dollar volume of the market. It is expected that most of the remaining devices (mainly imports) will be modified to meet the amendments, with a resulting increase in cost of between 25 to 30 percent per modified unit.⁸

In its comments responding to the NPR, AFSL reported that for the 43 units it examined, 65 percent did not meet the 60-degree tip-angle test. The Commission is not using AFSL's estimate of 35 percent compliance with the tip-angle test, since the Commission's staff raised several questions about the accuracy of AFSL's estimate. Thus, the Commission continues to use the industry-wide data provided by NFA to estimate the portion of devices that would require modification (25 percent).

Assuming costs are passed on to consumers (as expected), the total annual cost to consumers of modifying the affected devices would be between \$1.5 million and \$2.7 million. While certain devices may be discontinued, the loss of consumer choice would be minimized by the availability of close substitutes—i.e., other large multiple-tube devices that comply with the amendments. Additionally, since most suppliers of currently noncomplying

⁸ Trade and industry sources report that modifying the devices would add about 25 to 30 percent to production costs (although one commenter on the NPR stated that the per-unit cost increase would be 35 to 45 percent). Various sales catalogs also indicate that comparable devices without bases are significantly less expensive.

devices are expected to maintain current sales levels and pass on costs to consumers, no significant adverse impact is expected in the suppliers' competitive positions.

If the changes eliminate all deaths associated with these devices, the cost per life saved would be between about \$4.5 and \$8 million. This is within the range of statistical values of life suggested in the recent professional literature. [22]

4. Alternatives to the Rule

The Commission considered several alternatives to the performance standard issued below, including a product ban, deferral to the voluntary standard, and additional labeling.

a. Product Ban. The expected benefits to society of banning all large multiple-tube devices would be one life saved every 3 years, the same as the potential benefits of the amendments. However, costs to society of a ban (as opposed to the performance standard) in terms of lost utility would be greater, because under a ban consumers would not be able to use large multiple-tube devices.

Large multiple-tube devices are unique with respect to the height and duration of their displays. There are no close substitutes for the product. Single-tube devices are available, but they do not provide the rapid sequential display of multiple-tube devices. The lost utility to consumers of not being able to use large multiple-tube devices cannot be measured precisely. However, the fact that consumers are willing to spend \$24-\$36 million annually to buy these devices suggests that the lost utility could be substantial.

The Commission believes that a ban of all large multiple-tube devices is not necessary, because a performance standard will likely achieve similar benefits with lower costs.

b. Defer to the Voluntary Standard. Another alternative is for the Commission to take no mandatory action, and to depend on a voluntary standard.

The AFSL revised its standard for mines and shells on an interim basis on January 29, 1993, and adopted it on September 5, 1995. In order to address the potential tip-over hazard associated with multiple-tube fireworks devices, AFSL's Voluntary Standard for Mines and Shells—Single or Multiple Shot requires that large multiple-tube devices not tip over (except as the result of the last shot) when fired on a 2-inch thick medium-density foam pad. [14] However, the Commission has concerns about the adequacy of the provisions of, and the level of conformance to, the AFSL standard.

The Commission also does not believe that AFSL's existing voluntary standard adequately reduces the risk of injury due to large devices tipping over while functioning. The Commission's tests using polyurethane foam did not find sufficient agreement between tip-over performance on foam and on grass. The Commission has no data that would support AFSL's dynamic test. As explained in section G above, the test results AFSL submitted in response to the NPR were limited and the Commission does not believe they show that this dynamic test is reliable.

In addition, even if the AFSL standard were effective, the Commission concludes that compliance with the standard would not be adequate. The majority of large multiple-tube devices are domestic. In the NPR, the Commission stated that according to AFSL, not a single domestically manufactured device has been certified as complying with the AFSL standard. In comments responding to the NPR, AFSL stated that their standards are voluntary "and the decision to comply with the standards rests solely with individual manufacturers." However, the Commission must have assurance of an adequate level of compliance with a voluntary standard in order to depend on that standard to reduce a risk. AFSL's limited testing conducted in response to the NPR does not substitute for an ongoing and comprehensive testing program.

AFSL reports that some shipments of imported large multiple-tube devices have been tested and certified in China this year and that, since January 1994, 30 percent of the lots it tested were rejected for failure to comply with the AFSL standard. However, the results of CPSC's compliance testing indicate that multiple-tube devices still tip over while functioning in dynamic tests on grass. In fiscal year 1994, all 24 imported devices the Commission tested, and 1 of 8 domestic devices, tipped over while functioning. In fiscal year 1995, 22 of 27 imported devices and 1 of 5 domestic devices tipped over. [19]

c. Additional Labeling

The current product has extensive labeling. The text of the labels required by the Commission is quoted in section D above. One alternative available to the Commission is to add further warning or instructional labeling to large multiple-tube devices or to modify the existing warning. Although this may have less impact on manufacturers and importers than a performance standard, the Commission believes that any additional or altered labeling is unlikely

to be effective in reducing the risk of injury.

Fireworks are frequently used at night, reducing the likelihood that warning labels will be read. The fact that fireworks are commonly used at parties or celebrations further reduces the likelihood that the user will read and follow a warning label. Moreover, tip-over may occur even if the user reads and follows the warning label. In both incidents involving large multiple-tube devices, the victims were spectators who were approximately 40 feet (12 meters) away from the device, which they probably believed was a safe distance. The devices were placed on smooth, hard surfaces, although one was angled to shoot over a lake. In light of these facts, it is unlikely that a warning label would have prevented these deaths. [1, Tab E]

K. Regulatory Flexibility Certification

Under the Regulatory Flexibility Act, 5 U.S.C. §§ 601-612, agencies generally are required to prepare proposed and final regulatory flexibility analyses describing the impact of the rule on small businesses and other small entities. However, these analyses are not required if the head of the agency certifies that the rule will not have a significant effect on a substantial number of small entities. As described below, the Commission has analyzed the potential effect of the amendment on industry.

The Commission has determined that the proposed standard will not have a significant impact on a substantial number of small businesses. The devices subject to the standard constitute less than 1 percent of the overall fireworks market. The foreign firms that make the types of devices subject to this rule that are likely to require modification in order to comply also make other types of fireworks. Only a small portion of the total production of these firms involves the large multiple-tube devices subject to the rule. Thus, the Commission certifies that no significant adverse impact on a substantial number of small firms, or other entities, will result from the amendment issued below.

L. Environmental Considerations

The Commission's regulations governing environmental review procedures state that the amendment of rules or safety standards establishing design or performance requirements for products normally have little or no potential for affecting the human environment. 16 CFR 1021.6(c)(1). The Commission does not foresee that this amendment to the existing fireworks

regulations will involve any special or unusual circumstances that would alter this conclusion. The Commission determines, therefore, that no significant environmental effects will result from the standard. Accordingly, no environmental assessment or environmental impact statement is required in this proceeding.

M. Effective Date

The rule will take effect in 1 year and will apply to multiple-tube fireworks devices with any tube measuring 1.5 inches or more in inner diameter that first enter commerce or are imported on or after the effective date. However, provisions may be stayed by the filing of proper objections. Notice of the filing of any objections or lack thereof will be given by publication in the Federal Register.

List of Subjects in 16 CFR Part 1500

Consumer protection, Hazardous materials, Hazardous substances, Imports, Infants and children, Labeling, Law enforcement, and Toys.

Conclusion

For the reasons given above, the Commission finds that cautionary labeling required by the FHSA is not adequate for multiple-tube devices having any tube 1.5 inches (3.8 cm) or larger in inner diameter and having a minimum tip angle larger than 60 degrees. Further, in order to protect the public health and safety and due to the degree and nature of the tip-over hazard presented by these devices, it is necessary to keep them out of commerce if they fail to meet this standard. Thus, the Commission amends Parts 1500 and 1507 Title 16 of the Code of Federal Regulations as follows:

PART 1500—[AMENDED]

1. The authority for Part 1500 continues to read as follows:

Authority: 15 U.S.C. 1261-1278

2. Section 1500.17 is amended by adding a new paragraph (a)(12) to read as follows:

§ 1500.17 Banned hazardous substances.

* * * * *

(a) * * *

(12) (i) *Large multiple-tube devices.* Multiple-tube mine and shell fireworks devices that first enter commerce or are imported on or after [insert date that is 1 year after publication], that have any tube measuring 1.5 inches (3.8 cm) or more in inner diameter, and that have a minimum tip angle greater than 60 degrees when tested in accordance with the procedure of § 1507.12 of this part.

(ii) *Findings.* (A) *General.* In order to issue a rule under the section 2(q)(1) of the FHSA, 15 U.S.C. 1261(q)(1), classifying a substance or article as a banned hazardous substance, the FHSA requires the Commission to make certain findings and to include these in the regulation. These findings are discussed in paragraphs (a)(12)(ii)(B) through (D) of this section.

(B) *Voluntary standard.* (1) One alternative to the tip-angle requirement that the Commission considered is to take no mandatory action, and to depend on a voluntary standard. The American Fireworks Safety Laboratory (AFSL) has a standard for mines and shells intended to address the potential tip-over hazard associated with multiple-tube fireworks devices. AFSL's Voluntary Standard for Mines and Shells—Single or Multiple Shot requires that large multiple-tube devices not tip over (except as the result of the last shot) when shot on a 2-inch thick medium-density foam pad. The Commission cannot conclude that AFSL's existing voluntary standard adequately reduces the risk of injury from large devices that tip over while functioning. The Commission's tests using polyurethane foam did not find sufficient agreement between performance on foam and on grass. No other data are available to show that this dynamic test is reliable.

(2) In addition, even if the AFSL standard is effective, the Commission does not believe that compliance with the standard will be adequate. AFSL reports that it has been testing in accordance with its standard since January 1994. However, the results of CPSC's compliance testing indicate that multiple-tube devices still tip over while functioning. In fiscal year 1994, all 24 imported devices the Commission

tested, and 1 of 8 domestic devices, tipped over while functioning. In fiscal year 1995, 22 of 27 imported devices and 1 of 5 domestic devices tipped over during Commission testing. The Commission finds that there is unlikely to be substantial compliance with the voluntary standard applicable to multiple-tube devices.

(C) *Relationship of benefits to costs.* The Commission estimates that the 60-degree tip-angle standard will eliminate the unreasonable tip-over risk posed by these devices. This will provide benefits of saving one life about every 3 years, and preventing an unknown number of nonfatal injuries. The annual cost of modifying affected devices is estimated to be between \$1.5 million and \$2.7 million. The Commission finds that the benefits from the regulation bear a reasonable relationship to its costs.

(D) *Least burdensome requirement.* The Commission considered the following alternatives: a ban of all multiple-tube devices with inner tube diameters 1.5 inches or greater; a dynamic performance standard; additional labeling requirements; and relying on the voluntary standard. Although a ban of all large multiple-tube devices would address the risk of injury, it would be more burdensome than the tip-angle standard. The Commission was unable to develop a satisfactory dynamic standard that would reduce the risk of injury. Neither additional labeling requirements nor reliance on the voluntary standard would adequately reduce the risk of injury. Thus, the Commission finds that a standard requiring large multiple-tube devices to have a minimum tip angle greater than 60 degrees is the least burdensome requirement that would prevent or adequately reduce the risk of injury.

PART 1507—[AMENDED]

1. The authority for Part 1507 continues to read as follows:

Authority: Sec. 2(q)(1)(B), (2), 74 Stat. 374 as amended 80 Stat. 1304–1305; (15 U.S.C. 1261); sec. 701(e), 52 Stat. 1055 as amended; 21 U.S.C. 371(e); sec. 30(a), 86 Stat. 1231; 15 U.S.C. 2079(a).

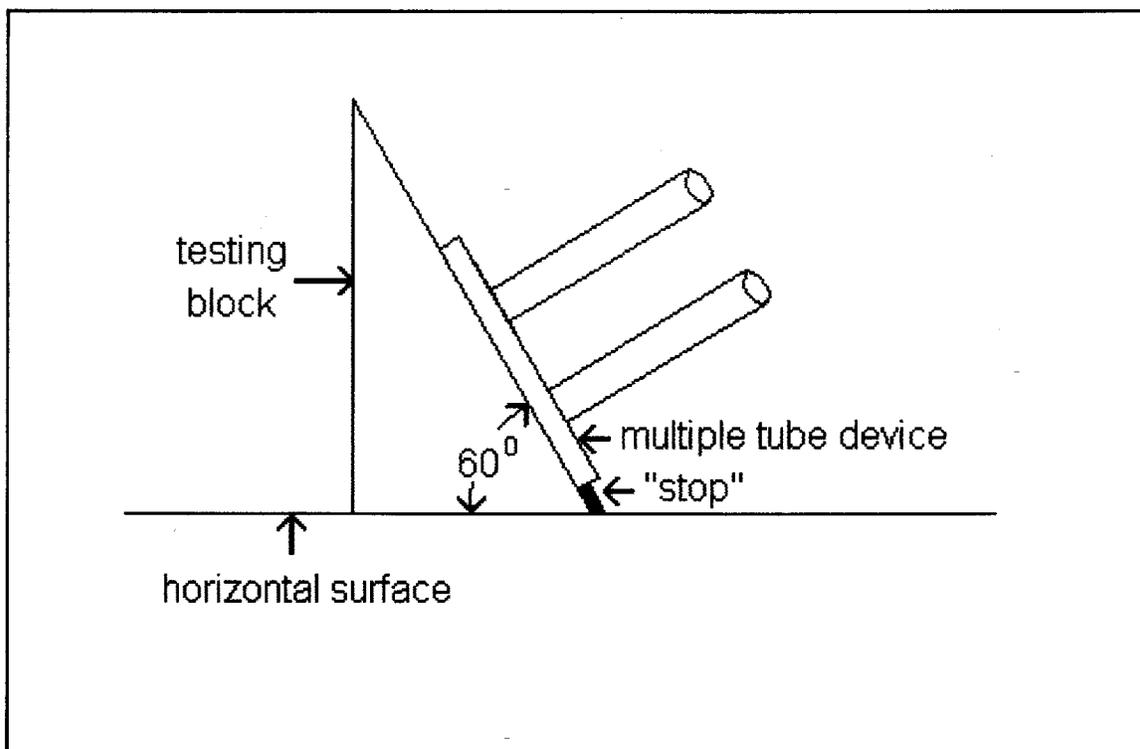
2. Part 1507 is amended by adding a new § 1507.12 to read as follows:

§ 1507.12 Multiple-tube Fireworks Devices.

(a) *Application.* Multiple-tube mine and shell fireworks devices with any tube measuring 1.5 inches (3.8 cm) or more in inside diameter and subject to § 1500.17(a)(12) of this part shall not tip over when subjected to the tip-angle test described in this section.

(b) *Testing procedure.* The device shall be placed on a smooth surface that can be inclined at 60 degrees from the horizontal, as shown in Figure 1 of this section. The height and width of the inclined plane (not including the portion of the plane below the mechanical stop) shall be at least 1 inch (2.54 cm) greater than the largest dimension of the base of the device to be tested. The test shall be conducted on a smooth, hard surface that is horizontal as measured by a spirit level or equivalent instrument. The mechanical stop on the inclined plane shall be 1/16 inches (1.6 mm) in height and perpendicular to the inclined plane. The stop shall be positioned parallel to the bottom edge of the inclined plane and so that no portion of the device to be tested or its base touches the horizontal surface. The device shall not tip over when the plane is inclined at 60-degrees from the horizontal. The procedure shall be repeated for each edge of the device. Figure 1 to § 1507.12

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Side view of an apparatus or testing block for testing compliance with the proposed 60-degree tilt angle standard.

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Dated: March, 18, 1996.

Sadye E. Dunn,

Secretary, Consumer Product Safety Commission.

Reference Documents. (The following list of documents will not be printed in the Code of Federal Regulations.)

The following documents contain information relevant to this rulemaking proceeding and are available for inspection at the Office of the Secretary, Consumer Product Safety Commission, Room 502, 4330 East-West Highway, Bethesda, Maryland 20814:

1. Multiple-tube Mine and Shell Fireworks Devices: Advance Notice of Proposed Rulemaking; Request for Comments and Information, 59 Fed. Reg. 33928 (July 1, 1994).

2. Briefing Package: Multiple-tube Mine and Shell Fireworks Devices, Consumer Product Safety Commission, May 31, 1994.

3. Briefing Memorandum on Multiple-tube Mine and Shell Fireworks Devices, from Ronald L. Medford, EXHR and Michael Babich, EHHE, to the Commission, June 8, 1995.

4. Memorandum from Michael Babich, Project Manager, HSHE, "Responses to Public Comments on Multiple-tube Mine and Shell Devices," May 22, 1995.

5. Memorandum from Leonard Schachter, EPHA, to Michael Babich, HSHE, "Annual Estimated Injuries Associated with Multiple-tube Mine and Shell Fireworks Devices," June 1, 1995.

6. Memorandum from James Carleton and Jay Sonenthal, LSHS, to Michael Babich,

HSHE, "Results for Dynamic Stability Testing of Large Multiple-tube Mine and Shell Devices," May 18, 1995.

7. Memorandum from Thomas Caton, ESME, to Michael Babich, HSHE, "Fireworks Testing: Test Surface Roughness," May 22, 1995.

8. Report from Terry Kissinger, EPHA, to Michael Babich, HSHE, "A Comparison of the Tip-over Performances of Multiple-tube Mine and Shell Devices on Grass and Foam," January 1995.

9. Memorandum from George F. Sushinsky, LSEL, to Michael Babich, HSHE, "Dimensional and Stability Measurements of Fireworks," March 10, 1995.

10. Memorandum from George F. Sushinsky, LSEL, to Michael Babich, HSHE, "Tip Angle Measurements of a Device with a Plastic Base," April 13, 1995.

11. Memorandum from Jay Sonenthal, LSHL, to Michael Babich, HSHE, "Test of a Device with a Plastic Base," May 22, 1995.

12. Memorandum from Sam Hall, CERM, to Michael Babich, HSHE, "Acceptable Tipover Rate for Multiple-tube Devices," November 21, 1994.

13. Memorandum from Anthony Homan, ECPA, to Michael Babich, HSHE, "Multiple-tube Mine and Shell Fireworks Devices—Regulatory Analysis," May 18, 1995.

14. Memorandum from Sam Hall, CERM, to Michael Babich, HSHE, "AFSL's Interim Voluntary Standard for Large Multiple-tube Mine and Shell Devices and Staff's Proposed Mandatory Static Performance Standard, May 25, 1995.

15. Product and Performance Standard for Mines and Shells—Single or Multiple Shot," Version 1.1, American Fireworks Standards

Laboratory, Bethesda, Maryland, January 28, 1993.

16. Memorandum from Neal Gasser, LSHL, to Michael Babich, HSHE, "Additional Tests of Multiple-tube Mine and Shell Devices," June 8, 1995.

17. Briefing Memorandum on Multiple-tube Mine and Shell Fireworks Devices—Final Rule, from Michael Babich, EHHE, and Ronald L. Medford, HIR, to the Commission, January 23, 1996.

18. Memorandum from Michael A. Babich, EHHE, "Responses to Comments on Multiple-tube Mine and Shell Devices," January 16, 1996.

19. Memorandum from Samuel B. Hall, CRM, to Michael Babich, HSHE,

"Compliance Tests of Large Multiple-tube Mine and Shell Devices under FY 1994 and FY 1995 Fireworks Enforcement Programs," December 8, 1995.

20. Memorandum from Leonard Schachter, EHHA, to Michael Babich, HSHE, "Annual Estimated Injuries Associated with Multiple-tube Mine and Shell Fireworks Devices," November 1, 1995.

21. Memorandum from Anthony Homan, ECPA, to Michael Babich, HSHE, "Multiple-tube Mine and Shell Fireworks Devices—Final Regulatory Analysis," January 16, 1996.

22. Viscusi, W.K., "The Value of Risks to Life and Health," Journal of Economic Literature, December 1993.

23. Kissinger, T.L., Fireworks Injuries—results of a 1992 NEISS study. U.S. Consumer Product Safety Commission, Washington, DC 20207. September 1993.

[FR Doc. 96-6857 Filed 3-25-96; 8:45 am]

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