

TAB 1



United States
CONSUMER PRODUCT SAFETY COMMISSION
Washington, D.C. 20207

MEMORANDUM

DATE: January 27, 2000

TO: Scott Heh, ESME
Project Manager, Dive Sticks

Through: Jacqueline Elder, ^{JE}Deputy Assistant Executive Director
Office of Hazard Identification and Reduction
Robert B. Ochsman, Ph.D., Director, ^{RBO}
Division of Human Factors (HF)

FROM: Catherine A. Sedney, HF (x1282) ^{CS}

SUBJECT: Prevention of Impalement Injuries Specification of the Position of Dive Sticks in Water

Dive sticks are used as toys and training devices for underwater retrieval games. They are typically made of rigid plastic, are cylindrical in shape, and measure about an inch in diameter and 8 inches in length. In July of 1999 the Commission published an Advanced Notice of Proposed Rulemaking (ANPR) to address the risk of penetration injuries which occur when children land on dive sticks placed in shallow water. Eight confirmed¹ incidents of this nature have been reported. The victims, all children between the ages of five and nine, jumped into, fell into, or sat down in, a pool or tub and landed on an upright stick. In each case the dive stick struck the child's perineum, and/or penetrated the rectum or vagina. Five incidents resulted in injuries requiring surgery and hospitalization, in the most severe injury, the victim suffered a perforated intestine and required a temporary colostomy.

Several factors combine to create the risk of vaginal and rectal impalement on dive sticks in shallow pools. Among the most important are the rigidity and the vertical orientation of the dive stick in water. Because the sticks are weighted they assume a fairly stable upright position with the weighted end against the pool bottom. When force is applied in line with the long axis of the sticks, they do not move or flex. In incidents of the type described above, it is assumed that the

A ninth incident was reported following the publishing of the ANPR. The complainant (the victim's grandmother) described an incident which had occurred two years previously. She reported that the unweighted dive stick was not filled and was floating on the surface of an inflatable wading pool with 3-foot sides. The victim did a back flip into the pool and landed on or near the dive stick, and suffered scratches to the outer walls of the rectum. The reported position of the dive stick is unlikely to have resulted in the injury reported, and staff speculates that the description may be an artifact of memory. The incident is noted here, however, because the injury is consistent with the pattern of impact on an erect dive stick on the bottom of the pool.

victim strikes the dive stick in line, or nearly so, with the long axis. Because the stick is braced against the floor, the impact causes a relatively rapid deceleration of the body part which was struck, with the force of the impact concentrated on the small area at the end of the stick. Thus the relatively fixed, upright position of the stick, in combination with its small cross section, creates the potential for penetration injuries.

The injury potential declines with the angle of impact of the body part relative to the long axis of the stick. The sticks stand upright because they are lighter at the top; this also means that if struck at an angle they will move in the direction of the applied force. Modification of the design to take advantage of this characteristic would minimize the possibility of vaginal/rectal penetration. Dive sticks designed to sit at an angle relative to the pool bottom, on the edge of the base, would not remain in a fixed position under the impact of a vertical load. In contrast to an upright stick, the body would push the stick away, the rate of deceleration would be slowed, and the force would be distributed over the larger surface area along the length of the stick. These factors significantly reduce the risk of injury.

The orientation of a child landing on a stick is variable, and impact at precisely the wrong angle may reorient the stick perpendicular to the bottom surface. Thus, slight deviations of the stick's position from vertical may not be adequate to preclude penetration scenarios. If the angle of the stick is sufficiently acute, both impact in line with the axis, and impact at an angle to the axis, would tend to displace the stick and limit the possibility of impalement. HF recommends a position for dive sticks under water that is at least 45 degrees from vertical to provide a sufficient safety margin to effectively limit the potential for serious injuries.

TAB 1



UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: May 3, 2000

To : File

Through : Mary Ann Danello, Ph.D., Associate Executive
Director, Directorate for Health Sciences *mad*
Dave Walden, Associate Executive Director, *DW*
Directorate for Engineering Sciences

From : Suad Nakamura, Ph.D., Physiologist, Division of Health Sciences, (x1202) *mad for SWN*
Scott Heh, Mechanical Engineer, Division of Mechanical Engineering, (x1308) *SH*

Subject : Development of an Exemption for Non-Rigid Dive Sticks.

Impalement injuries to the rectum and perineum usually occur when children are in a straddling position and then fall upon a vertical rigid object. Such objects may have a sharp pointed end such as a picket fence post or tree stump (or a branch), or smooth rounded ends such as a broom stick, a baton, or a bicycle seat (Beiler, 1998, Jona, 1997, Busch, et al, 1986, Vincent et al., 1985, Stern, 1975, Black et al., 1982, Heiss, 1975, Hollwarth, 1977). Falls on rigid, vertical objects may result in traumatic injuries to the perineum (the region of the body extending from the anus to the scrotum in males and from the anus to the vulva in females), the rectum, the scrotum, and the vaginal area. The severity of recto-vaginal lesions after impalement injury depends on the degree of penetration by the object. This, in turn, is dependent on the force and direction of the impact and the nature of the object. Pointed objects can cause tears with subsequent penetration. For dive sticks, staff defines impalement injuries as injuries that occur when impact with the dive stick results in tears to the perineum and/or when the dive stick penetrates the vagina or the rectum causing injury to the surrounding tissue or the internal organs.

In case studies of impalement injuries to children reported in the medical literature, the objects involved were rigid and had a vertical orientation. These characteristics are also evident in the reported dive stick incidents. The staff is not aware of any impalement injuries to the perineum that involved a flexible object. Given this information, one approach to modifying dive sticks to reduce the risk of impalement injury is to make them flexible. This approach was mentioned several times in the in-depth investigations and other materials reviewed by CPSC staff. The flexible dive stick approach was proposed by an expert witness for a plaintiff injured by a dive stick (Dr. George Pearsol, Duke University), and an unnamed physician who

Dive Stick Testing and Test Method

The proposed test method requires securing a vertical standing dive stick in a compression test rig. A gradual compression load is then applied downward at the top of the stick and in-line with the long axis of the stick. If, during the test, the force gauge does not reach 5-lbf, the dive stick is exempt from the regulation.

The compression load on the dive stick must be applied at a slow rate in order to avoid the potential for higher force gauge readings that could occur as load rates increase. Staff performed compression tests on various flexible and rigid dive sticks at the CPSC Engineering Laboratory. During these tests, the staff found that a load rate of 0.05 in/sec was sufficiently slow to minimize effects that faster load rates could have on force gauge readings. Common tension/compression test rigs found in most mechanical test labs can be adjusted to apply the load at the specified rate.

Testing on several samples of two types of flexible dive sticks showed that the products began deflecting almost immediately under load and the maximum force (typically in the range of 0.75 to 4.5 lbf) is achieved in under 10 seconds. As compression loading continued beyond 10 seconds, the dive stick continued to bend and the force reading did not increase. The compression load was applied for a total of 40 seconds on flexible dive sticks. At 40 seconds, the stick bent significantly, and the force readings had dropped further from the recorded maximum force. In sharp contrast to the flexible dive sticks, maximum force readings for rigid dive sticks exceeded 25-lbf in less than 3 seconds, with no noticeable bending.

A load rate of 0.05 in/sec applied for 40 seconds translates to a linear displacement of 2.0 inches. After 40 seconds of loading, the flexible dive sticks exhibit a significant amount of bending. If the test were to specify a much shorter period for load application, it is possible that unconventional dive stick designs (e.g., a dive stick that is rigid over most of its length and is flexible only at the tip of the product) could pass the test and yet still pose an impalement hazard. A load duration of 40 seconds provides greater assurance that the dive stick is flexible along a considerable portion of its length, making it unlikely that the dive stick would pose a risk of impalement injury.

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TAB G



UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

DATE: 25 April, 2000

TO: Scott Heh, ESME
Project Manager, Dive Sticks

Through: Jacqueline Elder, ^{JE} Deputy Assistant Executive Director
Office of Hazard Identification and Reduction
Robert B. Ochsman, Ph.D., Director, ^{RBO}
Division of Human Factors (HF)

FROM: Catherine A. Sedney, HF (x1282) ^{CAS}

SUBJECT: Minimum Age Child at Risk of Dive Stick Penetration Injuries

The Division of Human Factors (HF) was asked to identify the minimum age and weight at which a child may be at risk of penetration injuries from dive sticks in shallow water. Among the penetration incidents identified by CPSC staff, the youngest child was five years of age. The incident sample, however, is quite small, and is not statistically representative. Two factors indicate that children younger than five may be exposed to dive sticks, and thus to the risk of penetration injuries: (1) the shallow water depths reported in some of the incidents (e.g., six inches in a bathtub, 12 to 18 inches in wading pools, etc.), and (2) the details which suggest that none of the penetration injuries occurred while children were actually using the dive sticks. The incident scenarios thus suggest that a child need not be capable of using dive sticks as dive toys (that is, of maneuvering under water to retrieve them) to be exposed to the possibility of penetration injuries. Nor is the level of supervision (typically associated with age) relevant, as the incidents are unexpected and occur too quickly for an adult to intervene. The exemplar incident is one in which a child was injured by changing from a standing position to a sitting position in a bathtub with her mother standing nearby.

The youngest child who might be at risk of such an event is one who can walk, and thus can stand and sit independently. On average, this development occurs between 10 and 12 months of age (Bayley, 1969). The 5th percentile weight for this age group is 16.5 lbs. (Snyder, Spencer, Owings & Schneider, 1975). Although it is unlikely that dive sticks will be purchased specifically for a child of this age, young children may be exposed to dive sticks purchased for and used by older siblings.

References

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TAB H



UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: May 18, 2000

TO : Scott Heh, Project Manager for Dive Sticks

THROUGH: Warren Prunella, AED Directorate for Economic Analysis *WP*

FROM : Robert Franklin *RF*
Economist

SUBJECT : Draft Preliminary Regulatory Analysis for Dive Sticks

Attached is a draft Preliminary Regulatory Analysis of the rule that Staff is recommending that the Commission propose regarding dive sticks.

Dive Sticks:
Draft Preliminary Regulatory Analysis
18 May 2000

Robert Franklin
Economist
Directorate for Economic Analysis

Executive Summary

A dive stick is a type of toy used in swimming pools for underwater retrieval games and swimming instruction. They are usually cylindrical in shape. Typically, the length is 10 inches or less and the diameter is one inch or less. Many dive sticks have been made from rigid plastic and weighted so that they will sink to the bottom of the swimming pool and stand upright. Other dive sticks are hollow but could be weighted by the consumer so that they will stand upright at the bottom of a pool.

Since 1990 approximately 20 million dive sticks have been sold. About 15 firms manufactured or imported dive sticks during this period. From 1990 through 1999, the number of dive sticks available for use each year probably averaged 3 to 5.5 million, depending on the estimated expected life of a dive stick, which may range from 1 to 4 years.

When used in shallow water, a rigid and upright dive stick may cause serious impalement injury if a person jumps or falls on a dive stick and the dive stick enters the rectum or vagina of the victim. The staff is aware of at least 8 such impalement injuries since 1990. The annual societal cost of these injuries has averaged at least \$47,400 since 1990, or about 2 to 4 cents per dive stick over the expected useful life of the dive stick.

The proposed rule would reduce the risk of impalement injury by banning dive sticks that are made of a rigid material and are designed to stand upright on the bottom of the pool. The cost to manufacturers to modify dive sticks to meet the requirements of the rule is low and probably no more than the expected benefits.

The proposed rule is unlikely to have a significant impact on a substantial number of small firms or have an adverse impact on the environment.

Dive Sticks: Draft Preliminary Regulatory Analysis

Introduction

The Commission is proposing a rule intended to reduce the risk of injury from certain dive sticks. A dive stick is a type of pool toy used for underwater retrieval games and swimming and diving instruction. The Commission is aware of several incidents where children have been seriously injured when they jumped or fell onto a dive stick and the dive stick impaled the child in the rectal or genital region.

The proposed rule would ban dive sticks with certain characteristics that create the potential for impalement injuries when used in shallow water. Banned would be dive sticks that are made out of a rigid material and are, or can be, weighted so that they sink to the bottom of the pool and stand upright on the bottom. Dive sticks without these characteristics would not be banned. For example, dive sticks manufactured out of flexible material or that rest on the bottom of the pool at an angle more than 45 degrees from vertical would not be banned. Other types of dive toys such as dive rings and dive disks are unaffected by the proposed rule. Products known as "dive eggs" would also be covered by the proposed rule. However, the staff believes that most dive eggs already meet the requirements of the proposed rule since they do not rest vertically on the bottom of the pool.

The proposed rule, which is issued under the authority of the Federal Hazardous Substances Act, declares certain dive sticks to be a banned hazardous substance. When the Commission proposes a rule declaring something to be a banned hazardous substance it must publish a preliminary regulatory analysis (PRA). The PRA must contain a description of the potential benefits and potential costs of the proposed regulation, including any benefits or costs that cannot be quantified in monetary terms, and an identification of those likely to receive the benefits and bear the costs. This report contains the information required for the PRA.

Previous Commission Activity

The CPSC staff became aware of the impalement hazard associated with dive sticks in early 1999. The Commission undertook a two-pronged effort to address the hazard. The Commission's Office of Compliance began investigating the individual dive stick models available to consumers and worked with the manufacturers to recall the ones deemed hazardous. On 24 June 1999, CPSC announced that it had reached agreements with 15 manufacturers and importers to voluntarily recall their dive sticks.

Simultaneously with the Compliance activity, the Commission staff began investigating the product to determine if the Commission should initiate a regulatory proceeding to address this hazard. The Commission staff prepared a briefing package for the Commission, dated 24 June 1999, recommending that the Commission initiate a rulemaking proceeding that could result in a rule banning certain types of dive sticks. The

Commission voted to accept the staff's recommendation and an Advance Notice of Proposed Rulemaking (ANPR) was published in the Federal Register on 16 July 1999.

Product and Market Information

A dive stick is a type dive toy intended for use in swimming pools. They are usually cylindrical in shape, but some have novelty shapes such as shark silhouettes. Other dive sticks are generally cylindrical in shape but have a cross section resembling an "X." Typically, the length is 10 inches or less and the diameter is one inch or less. Many dive sticks have been made out of rigid plastic and weighted so that they will sink to the bottom of the pool and stand upright. Other dive sticks are hollow but could be weighted by the consumer so that they will stand upright at the bottom of a pool. Dive sticks are often numbered with a point value (e.g., 10 through 60) for counting up totals in games. In some cases, the units with the higher point values may be shorter than those with lower point values.

Several variations of dive games can be played with dive sticks. For example, the toys may be thrown into the pool and the player who collects the most toys or the toys with the highest total point value wins. Another game may involve one player at a time retrieving the toys from the pool bottom and the winner being either the one who was able to retrieve all the toys in the least amount of time or retrieved the most in a given amount of time. Dive sticks also have uses in swimming and diving instruction and relay events.

When used for swimming or diving instruction or retrieval games in relatively deep-water rigid and upright dive sticks do not appear to pose any apparent impalement hazard. Based on the confirmed incident data, the impalement hazard exists when dive sticks are used in relatively shallow water, such as in backyard wading pools, hot tubs, or the steps of swimming pools.¹ The CPSC staff does not have any information regarding the proportion of the dive sticks that are used exclusively in deeper water or the proportion that are at least occasionally used in shallow water.

Before the June 1999 recall, dive sticks were usually sold in sets of 3 to 6 sticks. They were often sold as part of a package that contained other toys, such as dive disks, eggs, and rings (e.g., a package may include 3 dive sticks, 3 dive rings, and 3 dive disks). They were also sold in conjunction with things such as masks, goggles, or snorkels. Retail prices were usually in range of \$4 to \$7 per set or about \$1 per individual stick. Retail prices were almost always less than \$10, even when sold with other products such as disks, rings, and snorkels.

Prior to the June 1999 recall, dive sticks were widely available. They were often sold in the seasonal aisles of grocery and drug stores at many department and variety

¹ A "safe" depth has not been determined. Impalement injuries have occurred in water as much as 27 inches deep.

stores. Dive sticks were also available through some mail order catalogs and at various pool and water toy dealers.

Of the manufacturers and importers that were involved in the June 1999 recall, five are currently marketing dive sticks made out of flexible material or dive sticks that do not stand upright at the bottom of the pool. Eight of the firms do not appear to be marketing dive sticks of any type at the current time.² This could be because their plans for the future production and sale of dive sticks have not been finalized or because they have withdrawn from the market. Alternatively, some may not now be offering dive sticks because they did not have time to both redesign and produce the dive sticks for the summer of 2000 selling season. Staff is not aware of the plans of the remaining two firms involved in the recall, despite efforts to contact them.

Sales and Number Available for Use

Based on information provided by several companies to the CPSC, 4 to 5 million dive sticks were sold in both 1997 and 1998. Altogether, about 20 million dive sticks have been sold since 1990. Sales of dive sticks increased substantially during the 1990's. According to one industry source, the increase in sales may be explained by the fact that mass merchants began to sell dive sticks in the early 1990's. Prior to the early 1990's dive sticks were sold almost exclusively by specialty pool and water toy dealers. When mass merchants began carrying dive sticks a larger proportion of the population became aware of the product and began buying them.

Estimates of the average number of dive sticks available for use annually can be obtained using information on historical sales and estimates of the average useful life of the product. While the average life of a dive stick is not known with any certainty, we believe that the average life of the product may range from 1 to 4 years. If we assume that the average life of a dive stick is one year, then the average number available for use each year from 1990 through 1999 was about 3 million units. On the other hand, if we assume an average product life of 4 years, then the average number available for use each year from 1990 through 1999 was about 5.5 million units.³ Since dive sticks were usually sold in packages of 3 to 6 sticks, about 1 million households may have owned dive sticks during any given year.⁴

The June 1999 recall of dive sticks received a significant amount of publicity. However, it is unknown how many dive sticks were returned or how many households disposed of any dive sticks they owned after finding out about the recall and the hazard. Therefore, there could still be a significant number of dive sticks available for use.

² These firms are, however, still marketing products that are close substitutes for dive sticks, such as dive rings, discs, and eggs.

³ Based on historical sales data and estimates of product population derived from the Directorate's Product Population Model.

⁴ Estimate derived from using the midpoints of the ranges of the estimated number available for use and the number in each set (4.25 million dive sticks ÷ 4.5 per set = 0.9 million sets). We assumed that each household had only one set of dive sticks at any given time.

In trade publications, dive sticks are classified in the water/pool/sand toys category. This category includes products such as water guns, floats, wading pools, and sand buckets. Sales vary with season, more being sold in the summer than in the winter. Sales of water/pool/sand toys also tend to vary from year to year depending on how hot the summer or swimming season is. In 1997, retail sales of water/pool/sand toys exceeded \$450 million (Playthings, September 1998, p. 30). Since dive sticks retail for approximately \$1 per stick, dive sticks likely made up less than 1.0 percent of retail sales in this category.

Prior to the June 1999 recall, the CPSC staff identified at least 15 firms that manufactured or imported dive sticks into the United States. Since the product is inexpensive and simple to manufacture, it is relatively easy for firms to enter or leave the dive stick market. Therefore, firms that have not supplied dive sticks in the past, and were not part of the June 1999 recall, could begin doing so.

Analysis of Benefits and Costs of Proposed Rule

Benefits of a Rule Banning Certain Dive Sticks

The purpose of the proposed rule is to prevent serious impalement injuries that can result when children jump or fall on dive sticks that are being used in shallow water. The benefits of the proposed rule would therefore be the resulting reduction in injuries.

The CPSC is aware of at least 8 impalement injuries (to the perineum) since 1990 involving dive sticks that were standing upright on the bottom of a pool.⁵ All of the victims received medical attention after the injury and at least 5 required surgery.⁶ In one case a temporary colostomy was performed. No fatalities are known to CPSC.⁷

The societal costs of these eight impalement injuries, based on estimates from the CPSC Injury Cost Model, range from about \$8,000 for injuries that do not require hospitalization to about \$90,000 for injuries that do require hospitalization. These estimates are based on the costs of injuries involving punctures or lacerations to the victims' lower trunk or pubic region for children 5 to 11 years-of-age. These cost estimates include the cost of medical treatment, pain and suffering, lost work time, and legal and liability costs.

If we assume that the only cases that required hospitalization were the 5 incidents that required surgery, the total societal costs of the known incidents is about \$474,000 (5

⁵ An additional incident was reported to CPSC, but there are some questions surrounding the nature of the incident and whether or not it is the result of the hazard that the rule under consideration would address.

⁶ CPSC memorandum from Debra Sweet, HA, to Scott Heh, Project Manager for Dive Sticks, 21 March 2000.

⁷ The CPSC is aware of 12 non-impalement injuries associated with dive sticks, including 4 incidents involving submerged dive sticks. Although the proposed rule is not directly aimed at reducing these injuries, some of these injuries may have been prevented by the proposed rule.

cases X \$90,000 and 3 cases X \$8,000) or an average of \$47,400 a year since 1990. This is a low estimate of the total societal cost of dive stick penetration injuries because it is based only on the cases known to CPSC. There may have been other injuries of which CPSC is not aware.

The potential benefit of a standard that would prevent dive stick impalement injuries is the expected societal costs of the injuries prevented. To compare the benefits of a proposed rule to the costs (which will be discussed in the next section) it is useful to estimate the expected societal costs of dive stick injuries (and hence, the potential benefits) on a per dive stick in use basis.

As discussed earlier, the average number of dive sticks in use since 1990 probably ranged from about 3 million units (assuming a one-year product life) to about 5.5 million units (assuming a 4-year product life). Therefore, the annual societal costs of dive stick injuries may range from about one cent per dive stick in use ($\$47,400 \div 5.5$ million sticks) to about 2 cents per dive stick in use ($\$47,400 \div 3$ million sticks).

Since dive sticks may last for one to four years, the potential benefits of the rule per dive stick (if it eliminates all penetration injuries) may range from about 2 cents per dive stick ($\$0.02 \times 1$ year) to about 4 cents per dive stick ($\$0.01 \times 4$ years). The potential benefits would be higher if there have been impalement injuries for which the Commission is not aware. Therefore, the 2 to 4 cents per dive stick probably represents a minimum estimate of the potential benefits, if all injuries can be prevented.

The benefits would accrue primarily to households with children, since all victims have been 11 years old or younger. However, since medical costs are generally pooled through insurance, and some of the benefits include a reduction in lost worktime, the monetary benefits of the proposed rule would be diffused through society as a whole.

Potential Costs of the Proposed Rule

If the rule under consideration is adopted, manufacturers that continue to produce and sell dive sticks will have to ensure that their products conform to the requirements of the proposed rule. Some manufacturers began taking steps to modify their dive sticks after the June 1999 recall and may already have models that will meet the requirements of the proposed rule.

The costs of modifying the designs and production processes of rigid and upright dive sticks to meet the requirements of the proposed rule are not known, but the CPSC staff believes that these changes can be made with minimal impact on tooling and other production processes. For example, some manufacturers may be able to continue using the molds and production processes used for rigid dive sticks, but with a softer or more flexible plastic. Other manufacturers may be able to adjust the weight or center of gravity of the dive sticks so that they do not stand upright when submerged. Consequently, it seems reasonably likely that when the incremental costs of the proposed rule are spread

over large production runs, the cost will be no more than the benefits of the rule -- 2 to 4 cents per dive stick manufactured.

Moreover, the production of dive sticks does not require much in the way of specialized facilities or dedicated equipment, other than certain product molds. Therefore, even if a manufacturer opted not to redesign the dive sticks, the cost to the manufacturer would be limited to the premature disposal of certain dedicated equipment, such as molds. However, for the most part, the manufacturers' facilities and equipment could be used for manufacturing other products.

The proposed rule could reduce consumer utility if consumers prefer the banned dive sticks to the substitute products (i.e., dive sticks and eggs that do not stand upright, dive rings, dive disks, and so on). However, because these substitute products serve essentially the same purposes and would cost about the same,⁸ any negative impact on consumer utility, if any, is unlikely to be significant.

Impact on Small Businesses

The Regulatory Flexibility Act requires that the Commission consider the impact of its actions on small entities, including small businesses. Most of the 15 firms that manufactured or imported dive sticks are small businesses according to the Small Business Administration guidelines since they have fewer than 100 employees for importers or 500 employees for manufacturers.

The proposed rule is unlikely to have a significant impact on a substantial number of small firms for several reasons. First, as discussed above, the costs of the rule are likely to be small. Moreover, to the extent that the costs of the product increase, they are likely to be passed on to consumers in the form of higher retail prices.

Second, dive sticks probably account for only a small percentage of any individual firm's sales. Several of the manufacturers market various types of pool or other types of toys. Others have additional product lines such as pool supplies and equipment. Additionally, most of the firms that manufactured or imported dive sticks also distribute similar toys (such as dive rings and disks and certain dive eggs that do not rest vertically on the bottom) that would not be covered by the ban. If firms stopped producing and selling dive sticks, sales of these substitute products may increase, offsetting any loss due to a ban on dive sticks.

⁸ Dive rings appeared to retail for approximately the same price per pack as dive sticks, but there were generally fewer dive rings per pack as dive sticks. For example, packages of dive sticks often contained 6 sticks; packages of dive rings seldom contain more than 4 rings. The retail prices of dive disks per package and per disk appeared to be roughly equal to the retail prices of dive sticks. As stated elsewhere, the cost to modify dive sticks and dive eggs to meet the suggested requirements is probably less than 2 to 4 cents per unit.

Finally, most manufacturers removed their dive sticks from the market in response to the June 1999 recall. Some manufacturers have already taken steps to redesign their products. If the redesigned products conform to the proposed rule, the manufacturers will not incur additional costs.

Environmental Impact

The National Environmental Policy Act requires that the Commission consider the impact of its actions on the environment. Manufacturers that wish to market a dive stick are expected to be able to do so by making minor modifications to the previous production methods, such as weighting them so that they will lie flat or off-vertical, or are flexible rather than rigid. These changes are unlikely to have an adverse impact on the environment. Therefore, the proposed rule is unlikely to have a significant impact on the use of materials, waste disposal, energy use, or otherwise affect the environment.

Alternatives Considered

There are several alternatives to a ban that the Commission could consider. These include taking no action or relying on a voluntary standard, a labeling only requirement, and changing the scope of the products subject to a ban.

Taking No Action or Rely on a Voluntary Standard or Section 15 Activities

The Office of Compliance has successfully negotiated recalls with many of the known firms that manufactured or imported dive sticks. Other firms for which recalls were not negotiated have voluntarily ceased distributing the product. However, since it is relatively easy for firms to enter this market new firms could begin selling dive sticks. CPSC staff aware of at least one firm that is distributing dive sticks that was not involved in the June 1999 recall. The Commission could continue to recall dive sticks when they are found, instead of banning them outright. However, this approach would require the CPSC staff to make a determination that a product was hazardous each time that a new dive stick was introduced to the market. Additionally, without the standard, potentially hazardous products would be in the marketplace while CPSC staff was making this determination.

There is no voluntary standard for dive sticks that addresses the hazard, nor was a proposed standard submitted in response to the ANPR. Even if one were developed, it would be difficult to enforce since dive sticks are relatively easy to manufacture and new firms could easily begin distributing the product. Therefore, compliance with a voluntary standard may be low.

Labeling Only Requirement

The staff explored the possibility of a warning label. However, according to the Commission's Human Factors staff, a warning label is the least effective approach to reducing the number of injuries. A label that is highly visible and clearly communicates the hazard could have a significant impact at the point of purchase. However, a label on the package would not remain with the product after the sale, and because the product is intended for use in the water, it is likely that any label attached to the product itself would not last the life of the product. Moreover, the surface area on a dive stick is not conducive to designing an effective warning label.

Changing the Scope

The scope of the rule could be modified so that it applies only to pre-weighted dive sticks. However, the staff found that consumers could weight some unweighted dive sticks so that they stood vertically when submerged. These products would then present exactly the same hazard as the pre-weighted dive sticks.

TAB I

DRAFT 5/26/2000

CONSUMER PRODUCT SAFETY COMMISSION

16 CFR Part 1500.18

Dive Sticks; Notice of Proposed Rulemaking

AGENCY: Consumer Product Safety Commission.

ACTION: Notice of proposed rulemaking.

SUMMARY: The Commission is proposing a rule to ban certain dive sticks under the authority of the Federal Hazardous Substances Act. Dive sticks are used for underwater activities, such as retrieval games and swimming instruction. They are typically made of rigid plastic and stand upright at the bottom of a swimming pool. Due to these characteristics, if a child jumps onto a dive stick in shallow water he or she may suffer severe injuries.

DATE: Written comments in response to this notice must be received by [insert date that is 75 days after publication].

ADDRESSES: Comments should be mailed, preferably in five copies, to the Office of the Secretary, Consumer Product Safety Commission, Washington, D.C. 20207-0001, or delivered to the Office of the Secretary, Consumer Product Safety Commission, Room 502, 4330 East-West Highway, Bethesda, Maryland; telephone (301) 504-0800. Comments also may be filed by telefacsimile to (301)504-0127 or by email to cpsc-os@cpsc.gov. Comments should be captioned "NPR for Dive Sticks."

FOR FURTHER INFORMATION CONTACT: Scott R. Heh, Directorate for Engineering Sciences, Consumer Product Safety Commission, Washington, D.C. 20207; telephone (301) 504-0494, ext. 1308.

SUPPLEMENTARY INFORMATION:

A. Background

As of October 1999, the Commission is aware of eight confirmed impalement incidents involving dive sticks that were submerged and standing vertically. These incidents resulted in injuries to the perineal region of young children. The products were cylindrical batons, approximately $7 \frac{7}{8}$ to $8 \frac{5}{8}$ inches long and $\frac{7}{8}$ to one inch in diameter. They were all constructed of rigid plastic.

In early 1999, when the Commission staff first learned of incidents involving dive sticks, the staff worked with product manufacturers to recall hazardous dive sticks. On June 24, 1999, the Commission announced that it had reached agreements with 15 manufacturers and importers to voluntarily recall their dive sticks. The recalls have removed most dive sticks from the market.[1]¹ However, because the hazard posed by dive sticks appeared to be inherent to the product and not related to any specific model or manufacturer, the Commission began a proceeding to ban all dive sticks with hazardous characteristics.

¹ Numbers in brackets refer to documents listed at the end of this notice.

On July 16, 1999, the Commission issued an advance notice of proposed rulemaking ("ANPR") announcing the Commission's intent to issue a rule addressing the risk of injury presented by dive sticks. 64 FR 38387 (1999). One alternative discussed in the ANPR was a rule declaring certain dive sticks to be banned hazardous substances. The Commission received one comment on the ANPR from the Department of Fair Trading, New South Wales ("NSW"), Australia. Although the NSW Department of Fair Trading states that it is unaware of any similar incidents in Australia, NSW is taking certain steps to protect against such injuries occurring, including issuing a design guide requiring that underwater toys be designed to reduce the hazard of impalement.[3]

B. Statutory Authority

This proceeding is conducted pursuant to the Federal Hazardous Substances Act ("FHSA"), 15 U.S.C. 1261 *et seq.* Section 2(f)(1)(D) of the FHSA defines "hazardous substance" to include any toy or other article intended for use by children that the Commission determines, by regulation, presents an electrical, mechanical, or thermal hazard. 15 U.S.C. 1261(f)(1)(D). An article may present a mechanical hazard if its design or manufacture presents an unreasonable risk of personal injury or illness during normal use or when subjected to reasonably foreseeable damage or abuse. Among other things, a mechanical hazard could include a risk of

injury or illness "(3) from points or other protrusions, surfaces, edges, openings, or closures, ... or (9) because of any other aspect of the article's design or manufacture." 15 U.S.C. 1261(s).

Under section 2(q)(1)(A) of the FHSA, a toy, or other article intended for use by children, which is or contains a hazardous substance accessible by a child is a "banned hazardous substance." 15 U.S.C. 1261(q)(1)(A).

Section 3(f) through 3(i) of the FHSA, 15 U.S.C. 1262(f)-(i), governs a proceeding to promulgate a regulation determining that a toy or other children's article presents an electrical, mechanical, or thermal hazard. As provided in section 3(f), this proceeding began with an ANPR. 64 FR 38387 (1999). After considering the comment submitted in response to the ANPR, the Commission is now issuing a proposed rule and a preliminary regulatory analysis in accordance with section 3(h) of the FHSA. The Commission will then consider the comments received in response to the proposed rule and decide whether to issue a final rule and a final regulatory analysis. 15 U.S.C. 1262(i)(1). Before the Commission can issue a final rule it must find (1) if an applicable voluntary standard has been adopted and implemented, that compliance with the voluntary standard is not likely to adequately reduce the risk of injury, or compliance with the voluntary standard is not likely to be substantial; (2) that benefits expected from the regulation

bear a reasonable relationship to its costs; and (3) that the regulation imposes the least burdensome alternative that would adequately reduce the risk of injury. Id. 1261(i)(2).

C. The Product

Dive sticks are used in swimming pools for underwater retrieval activities, such as retrieval games and swimming instruction. They are made of rigid plastic. They are often cylindrical in shape, typically ten inches or less in length with a diameter one inch or less, but some have novelty shapes such as shark silhouettes. They are or can be weighted so that when dropped into water they sink and stand upright on the bottom. Dive sticks are sold under a variety of names such as dive sticks, diving sticks, fish sticks, sticks, and batons. The Commission believes that the characteristics most important to creating the risk of impalement injury are that dive sticks (1) are rigid, (2) submerge and come to rest at the bottom of a pool of water, and (3) stand upright once submerged.[5]

Before the June 1999 recalls, dive sticks were usually sold in sets of 3 to 6 sticks. They were often sold as part of a package that contained other toys, such as dive disks, eggs, and rings (e.g., a package may include 3 dive sticks, 3 dive rings, and 3 dive disks). Retail prices usually ranged from \$4 to \$7 per set or about \$1 per individual stick. Retail prices were almost always less than \$10, even

when sold with other products such as disks, rings, and snorkels.[8]

An estimated 4 to 5 million dive sticks were sold in both 1997 and 1998. Altogether, about 20 million dive sticks have been sold since 1990. Sales of dive sticks increased substantially during the 1990's. About 1 million households may have owned dive sticks during any given year.[8]

In 1997, retail sales of water/pool/sand toys exceeded \$450 million. Since dive sticks retail for approximately \$1 per stick, dive sticks likely made up less than 1.0 percent of retail sales in this category. Before the June 1999 recalls, the CPSC staff identified at least 15 firms that manufactured or imported dive sticks into the United States. Most of the importers obtained their products from China, Hong Kong, or Taiwan. Since the product is inexpensive and simple to manufacture, it is relatively easy for firms to enter or leave the dive stick market. Therefore, firms that have not supplied dive sticks in the past, and were not part of the June 1999 recalls, could begin or renew producing or supplying dive sticks.[8]

D. The Risk of Injury

1. Description of Injury. Impalement injuries have occurred when a child accidentally fell or jumped buttocks-first into shallow water and landed on a dive stick. Serious rectal or vaginal injuries can result. Less serious

injuries such as facial and eye injuries are also possible when a child attempts to retrieve a dive stick under the water.[2]

Falls on vertical objects may result in traumatic injuries to the perineum. The severity of injuries depends on the degree of penetration by the object. This in turn is dependent on the force of impact and the physical properties of the dive stick (size and surface characteristics). The injuries could range from laceration of the rectum and sphincter, to puncture wounds and tears of the colon. High impact forces may also cause injuries to the vulva, vaginal canal, and blood vessels beneath the perineal skin in females. In males, such impacts may cause perforation injuries to the genitalia, urethra, ureter and bladder. All these types of perforation and impalement injuries in males and females require hospitalization and surgery.

Because of the nature of the area, the main complication after perineum injuries is lesion infection, which may lead to abscess and possible sepsis in extreme cases. To avoid subsequent septic complications, surgery may be necessary. Perineal injuries (with or without rectal injury) often require fecal diversion (proximal colostomy), wound drainage, and the use of a broad-spectrum antibiotic in pre- and post-operative stages. The damage caused by deep penetration into the rectal or vaginal area may have devastating effects on a child's health. In addition to

long-term physiological effects, these types of injuries have the potential to cause long-lasting emotional trauma.

2. Impalement Injury data. As of October 1999, the Commission is aware of eight confirmed impalement injuries involving submerged vertically-standing dive sticks, including three since the Commission issued its ANPR. All the victims were children ranging in age from five to nine years old.[2]

Four females (ages 7 to 9) sustained injuries when the dive stick penetrated the vagina. One male (age 7) and two females (ages 5 and 6) suffered injuries when the dive stick penetrated the rectum. In the remaining incident, a seven year-old female received external lacerations around the rectum after landing on a dive stick. Medical attention was sought after each incident, and five of the injuries required surgery to address multiple internal and external injuries.[2]

These eight incidents involved vertical-standing dive sticks. The products were cylindrical batons, approximately $7 \frac{7}{8}$ to $8 \frac{5}{8}$ inches long and $\frac{7}{8}$ to one inch in diameter.² One of the dive sticks was white in color, another was blue; the colors of the remaining dive sticks are unknown. In one incident, it was reported that the victim could not see the

² Two incident reports approximated the length between 6 and 8 inches; however, the products were not available for measurement.

dive stick because of the white color and the faded blue numbers.[2]

The victims in seven of these eight confirmed incidents were injured while playing in shallow depths of water. Of these, four occurred in small wading pools with water levels between 12 and 24 inches. Of the remaining three incidents, one occurred in a spa with unknown water depth, one occurred in a pool measuring three feet in height with approximately 27 inches of water, and the final incident occurred in a bathtub with approximately 6 inches of water. The eighth incident reportedly took place in a pool; however, neither the type of pool nor the water depth is known.³[2]

The July ANPR provided summaries of impalement incidents reported at that time. Below are summaries of the impalement injuries reported since the ANPR was published.

a. June 9, 1999 -- The five year-old female victim was playing in an inflatable wading pool. The victim was jumping up and down in the pool when she slipped and fell directly on top of one of four vertically standing dive sticks in the pool. The victim was impaled rectally by the dive stick. She was hospitalized overnight for observation. She was treated for an anal tear and an internal laceration to her rectum.

b. April 1999 -- The seven year-old female was taking a bath under the supervision of her mother. The dive stick

³ A ninth unconfirmed incident was reported to CPSC, but many details of the incident remain unclear.

was in the bathtub, standing vertically in the water. The child stood up to lather her legs, sat back down to rinse off and sat on a dive stick which went into her vagina. The victim was hospitalized overnight and underwent surgery for vaginal lacerations. Long term prognosis was unavailable.[2]

3. Non-impalement injury data. In addition to genital and rectal injuries, the Commission received reports of four injuries to other body parts that occurred when the victim submerged onto the vertical-standing dive stick. The injuries occurred when the children attempted to retrieve the dive sticks from the bottom of the pool. A female victim, age 6, received a facial laceration when she stuck her face in the water and contacted the product. One boy, age 8, dived head first into the pool and hit his forehead on the product. The third victim, a 7 year-old male, jumped into the pool feet first and punctured his foot on the sharp edge of the dive stick after it broke from the initial contact. The fourth victim, a 9 year-old male, lacerated his back on the sharp edge of a dive stick when he dived into the pool to retrieve the product.[2]

The Commission has also received reports of six incidents of victims struck by a thrown dive stick. Three of the injuries were facial lacerations, two resulted in an eye injury and one child broke a tooth. Two other children

were reportedly injured when they fell while carrying dive sticks.[2]

E. The Proposed Ban

The Commission is proposing to ban dive sticks with certain hazardous characteristics. Although voluntary recalls have removed most, if not all, of these products from the market for the present time, the Commission is concerned that, without a rule banning them, they could reappear on the market.

The proposed rule would ban dive sticks that (1) are rigid, (2) submerge to the bottom of a pool of water, and (3) stand upright in water. After considering the reported impalement injuries, the Commission believes that these are the essential characteristics that create the impalement hazard. Dive sticks and similar articles that do not have these characteristics, as well as dive rings and dive discs, would still be allowed.

All dive stick impalement incidents and other rectal or vaginal impalement cases reported in the medical literature involved objects that were rigid. The staff is not aware of any impalement injuries to the perineum that involved a flexible object. In order to prevent serious injuries, the dive stick should be of sufficient flexibility that it would bend to a degree that prevents penetration when impact occurs with the perineal area. The staff developed a test to distinguish dive sticks that are sufficiently flexible so

as to effectively limit the potential for serious impalement injury.

The Commission believes that it is appropriate to base a rigidity test on a fraction of the weight of a child who is first beginning to walk. Although the youngest child involved in a reported impalement incident was five years old, if a child can walk independently it is possible that he or she might be playing in a shallow body of water and fall onto a dive stick in the same manner that occurred in the impalement incidents. Children begin to walk on their own at about 11 1/2 months. Therefore, the test uses the weight of a 10 to 12 month-old child. The weight of a 5th percentile 10 to 12 month-old child is 16.5 pounds (7.5 kg). The Commission believes that a failure criterion of 5-lbf (approximately 1/3 of the weight of a 10 to 12 month-old child) will provide a margin of safety to effectively limit the potential for a serious impalement injury.

The proposed performance test applies a gradual compression load to the top of the dive stick for a period of 40 seconds. If the force reaches 5 lbf the dive stick is too rigid and fails the test. The Commission is aware that some manufacturers are developing dive sticks that are constructed of flexible material that would pass this test. The Commission believes that such flexible articles would not pose an impalement hazard.[5,7]

All confirmed impalement injuries occurred with dive sticks that had submerged to the bottom of a pool of water. It is unlikely that a child falling onto a dive stick floating on the water would suffer impalement. A floating dive stick is likely to move away before the child's body strikes the bottom of the pool. [3,6]

The vertical orientation of a submerged dive stick is a key factor in these impalement incidents. The Commission's Human Factors staff examined the reported incidents and concluded that when force is applied in line with the long axis of the dive sticks (as it is when a child lands on it in a vertical position), the sticks do not move. "Because the stick is braced against the floor, the impact causes a relatively rapid deceleration of the body part which is struck, with the force of the impact concentrated on the small area at the end of the stick." The Human Factors staff believes that the potential for impalement injury declines as the angle of impact moves away from the vertical. However, the orientation of a child landing on a stick is variable, and impact at precisely the wrong angle may reorient the stick perpendicular to the bottom surface. Thus, slight deviations of the stick's position from vertical may not be adequate to avoid impalement. If the angle of the stick is sufficiently away from vertical, both impact in line with the axis and impact at an angle to the axis would tend to move the stick and limit the possibility

of impalement. The Commission believes that a position at least 45 degrees from vertical would provide a sufficient safety margin to effectively limit the potential for impalement injuries.[3,6]

F. Alternatives

The Commission has considered other alternatives to reduce the risk of impalement injury related to dive sticks. However, as discussed below, the Commission does not believe at this point that any of these would adequately reduce the risk of injury.

Voluntary Recalls. Before beginning this proceeding the Commission negotiated voluntary recalls with many companies that manufactured or imported dive sticks, and many other firms voluntarily removed their dive sticks from the market. One alternative to the banning rule is for the Commission to continue pursuing recalls on a case-by-case basis. However, it appears that the impalement hazard is present in all dive sticks that have the hazardous characteristics the staff has identified. The hazard is not limited to one particular model or brand. Therefore, a rule banning all dive sticks with the identified characteristics is more efficient. While the recalls have removed hazardous dive sticks from the market for now, proceeding with future recalls in the absence of a banning rule would allow hazardous dive sticks to return to the market until the Commission had a chance to act on the new dive sticks.[8]

Voluntary Standard. Currently, there is no applicable voluntary standard, nor was one submitted in response to the ANPR. Moreover, because dive sticks are relatively inexpensive and easy to manufacture, compliance with a voluntary standard may be low.[8]

Labeling. One alternative to a banning rule would be to require cautionary labeling for dive sticks. Most dive sticks carry some warnings regarding small parts (in reference to the end caps); use only under the supervision of a competent swimmer, and/or against diving in shallow water. In order for a label warning of the impalement hazard to be fully effective, consumers must notice, read, and understand it, then comply with it 100% of the time. People are less likely to comply with a warning if the connection between the product and the injury potential is not clear, if they cannot imagine what the injury is, or if they do not fully understand how to avoid the hazard. As the impalement hazard presented by dive sticks is not apparent, the label would have to convey clearly that severe rectal or genital injuries can result if children jump into the water and land on the sticks. Further, a "safe" water depth would have to be identified to give consumers adequate information on which to base their purchasing decision. A label that meets these criteria could have a significant impact at the point of purchase, but would need to be reinforced with an on-product warning. It would be

difficult, however, to develop a label that is highly noticeable and easy to read because of the small and typically curved surface area of the dive stick. Moreover, a label may not last the life of the product because it is used in water. In contrast, the effectiveness of banning hazardous dive sticks is not in question, because the impalement hazard would be minimized or eliminated. [3,8]

Change in Scope.

A final alternative considered was to modify the scope of the rule so that it would apply only to pre-weighted dive sticks. However, it is easy to add weight to certain unweighted dive sticks with water, sand or similar materials so that they too can stand vertically at the bottom of a pool. Because such unweighted dive sticks can pose the same risk as pre-weighted ones, the Commission is including them in the rule.

G. Preliminary Regulatory Analysis

Introduction

The Commission has preliminarily determined to ban dive sticks with certain hazardous characteristics. Section 3(h) of the FHSA requires the Commission to prepare a preliminary regulatory analysis containing a preliminary description of the potential benefits and costs of the proposed rule, including any benefits or costs that cannot be quantified in monetary terms; an identification of those likely to be affected; discussion of existing or developing standards

submitted in response to the ANPR; and a description of reasonable alternatives. 15 U.S.C. 1261(h). The following discussion addresses these requirements.[8]

Potential Benefits of a Rule Banning Certain Dive Sticks

The purpose of the proposed rule is to prevent serious impalement injuries that can result when children jump or fall on dive sticks that are being used in shallow water. The benefits of the proposed rule would therefore be the resulting reduction in injuries.

The CPSC is aware of eight confirmed impalement injuries (to the perineum) since 1990 involving dive sticks that were standing upright on the bottom of a pool.⁴ All of the victims received medical attention after the injury and at least five required surgery. In one case a temporary colostomy was performed. No fatalities are known to CPSC.

The societal costs of these eight impalement injuries, based on estimates from the CPSC Injury Cost Model, range from about \$8,000 for injuries that do not require hospitalization to about \$90,000 for injuries that do require hospitalization. These estimates are based on the costs of injuries involving punctures or lacerations to the victims' lower trunk or pubic region for children 5 to 11 years-of-age. These cost estimates include the cost of

⁴ An additional incident was reported to CPSC, but there are some questions surrounding the nature of the incident and whether or not it is the result of the hazard that the rule under consideration would address.

medical treatment, pain and suffering, and legal and liability costs.

If we assume that the only cases that required hospitalization were the five incidents that required surgery, the total societal costs of the known incidents is about \$474,000 (5 cases X \$90,000 and 3 cases X \$8,000) or an average of \$47,400 a year since 1990. This is a low estimate of the total societal cost of dive stick impalement injuries because it is based only on the cases known to CPSC. There may have been other injuries of which CPSC is not aware.

The potential benefit of a standard that would prevent dive stick impalement injuries is the expected societal costs of the injuries prevented. To compare the benefits of a proposed rule to the costs (which will be discussed in the next section) it is useful to estimate the expected societal costs of dive stick injuries (and hence, the potential benefits) on a per dive stick in use basis.

The average number of dive sticks in use since 1990 probably ranged from about 3 million units (assuming a one-year product life) to about 5.5 million units (assuming a 4-year product life). Therefore, the annual societal costs of dive stick injuries may range from about one cent per dive stick in use ($\$47,400 \div 5.5$ million sticks) to about 2 cents per dive stick in use ($\$47,400 \div 3$ million sticks).

Since dive sticks may last for one to four years, the potential benefits of the rule per dive stick (if it eliminates all impalements) may range from about 2 cents per dive stick ($\$0.02 \times 1$ year) to about 4 cents per dive stick ($\$0.01 \times 4$ years). The potential benefits would be higher if there have been dive stick injuries of which the Commission is not aware. Therefore, the 2 to 4 cents per dive stick probably represents a minimum estimate of the potential benefits, if all injuries can be prevented.

The benefits would accrue primarily to households with children, since all victims have been 11 years old or younger. However, since medical costs are generally pooled through insurance, the monetary benefits of the proposed rule would be diffused through society as a whole.

Potential Costs of the Proposed Rule

If the rule under consideration is adopted, manufacturers that continue to produce and sell dive sticks will have to modify their product to conform to the requirements of the proposed rule. Some manufacturers may be able to continue using the molds and production processes they use now, but with a softer or more flexible plastic. Other manufacturers may be able to adjust the weight or center of gravity of the dive sticks so that they do not stand upright when submerged.

The costs of these alternatives are not known, but the CPSC staff believes that these changes can be made with minimal impact on tooling and other production processes. Consequently, it seems reasonably likely that when the incremental costs of the proposed rule are spread over large production runs, the cost will be no more than the benefits of the rule -- 2 to 4 cents per dive stick manufactured.

Moreover, the production of dive sticks does not require much in the way of specialized facilities or dedicated equipment, other than certain product molds. Therefore, even if a manufacturer opted not to redesign the dive sticks, the cost to the manufacturer would be limited to the premature disposal of certain dedicated equipment, such as molds. However, for the most part, the manufacturers' facilities and equipment could be used for manufacturing other products.

The proposed rule could reduce consumer utility if consumers prefer the banned dive sticks to the substitute products (i.e., dive sticks and eggs that do not stand upright, dive rings, dive disks, and so on). However, because these substitute products serve essentially the same purposes and would cost about the same, negative impact on consumer utility, if any, is unlikely to be significant.

Existing or Developing Standards Submitted in Response to the ANPR

No existing voluntary standards were submitted in response to the ANPR. Nor were any proposals to develop such a standard submitted to the Commission. As stated above, the Commission is not aware of any voluntary standards applicable to dive sticks.

Alternatives Considered

As discussed above, the Commission considered the other alternatives of pursuing voluntary recalls, following a voluntary standard, requiring labeling, or changing the scope. Because the hazard affects all dive sticks with the hazardous characteristics the Commission has identified, a banning rule would be more effective than case-by-case recalls. No applicable voluntary standard exists and compliance may be low if one did. As discussed above, labeling could help reduce the risk of injuries from dive sticks, but would be less effective than a banning rule. Finally, the Commission is including non-weighted dive sticks that can be weighted because they pose the same risk of injury as weighted ones.

H. Regulatory Flexibility Certification

Under the Regulatory Flexibility Act ("RFA"), when an agency issues a proposed rule it generally must prepare an initial regulatory flexibility analysis describing the impact the proposed rule is expected to have on small entities. 5 U.S.C. 603. The RFA does not require a

regulatory flexibility analysis if the head of the agency certifies that the rule will not have a significant effect on a substantial number of small entities. 5 U.S.C. 605(b).

Most of the firms that manufactured or imported dive sticks are small businesses according to the Small Business Administration guidelines since they have fewer than 100 employees for importers or 500 employees for manufacturers. However, staff analysis suggests that the rule is unlikely to have a significant effect on any businesses, large or small.[8]

The Commission has previously worked with companies to recall hazardous dive sticks. Most manufacturers removed their dive sticks from the market in response to the recalls. Some manufacturers have already taken steps to redesign their products. If the redesigned products conform to the proposed rule, the manufacturers would not incur any additional costs.[8]

In addition, as discussed above, the costs of the rule are likely to be small. To the extent that the costs of the product increase, they are likely to be passed on to consumers in the form of higher retail prices.[8]

Finally, dive sticks probably account for only a small percentage of any individual firm's sales. Several dive stick manufacturers market various types of pool or other toys. Others have additional product lines such as pool supplies and equipment. Additionally, most of the firms

that manufactured or imported dive sticks also distribute similar toys (such as dive rings and disks and certain dive eggs that do not rest vertically on the bottom) that would not be covered by the ban. If firms stopped producing and selling dive sticks, sales of these substitute products may increase, offsetting any loss due to a ban on dive sticks.[8]

For the reasons stated above, the Commission certifies that the proposed rule banning dive sticks would not have a significant effect on a substantial number of small entities.

I. Environmental Considerations

Pursuant to the National Environmental Policy Act, and in accordance with the Council on Environmental Quality regulations and CPSC procedures for environmental review, the Commission has assessed the possible environmental effects associated with the proposed rule banning certain dive sticks.

The Commission's regulations state that rules providing design or performance requirements for products normally have little or no potential for affecting the human environment. 16 CFR 1021.5(c)(1). Nothing in this proposed rule alters that expectation. Therefore, because the rule would have no adverse effect on the environment, neither an environmental assessment nor an environmental impact statement is required.[8]

J. Executive Orders

According to Executive Order 12988 (February 5, 1996), agencies must state the preemptive effect, if any, of new regulations.

The FHSA provides that, generally, if the Commission issues a banning rule under section 2(q) of the FHSA to protect against a risk of illness or injury associated with a hazardous substance, "no State or political subdivision of a State may establish or continue in effect a requirement applicable to such substance and designed to protect against the same risk of illness or injury unless such requirement is identical to the requirement established under such regulations." 15 U.S.C. 1261n(b)(1)(B). Upon application to the Commission, a State or local standard may be excepted from this preemptive effect if the State or local standard (1) provides a higher degree of protection from the risk of injury or illness than the FHSA standard and (2) does not unduly burden interstate commerce. In addition, the Federal government, or a State or local government, may establish and continue in effect a non-identical requirement that provides a higher degree of protection than the FHSA requirement for the hazardous substance for the Federal, State or local government's own use. 15 U.S.C. 1261n(b)(2).

Thus, with the exceptions noted above, the proposed rule banning certain dive sticks would preempt non-identical

state or local requirements applicable to dive sticks designed to protect against the same risk of injury.

The Commission has also evaluated this proposed rule in light of the principles stated in Executive Order 13132 concerning federalism, even though that Order does not apply to independent regulatory agencies such as CPSC. The Commission does not expect that the proposed rule will have any substantial direct effects on the States, the relationship between the national government and the States, or the distribution of power and responsibilities among various levels of government.

K. Effective Date

The rule would become effective 30 days from publication of a final rule in the Federal Register and would apply to dive sticks entering the chain of distribution on or after that date. The Commission believes a 30-day effective date is appropriate because (1) due to the 1999 recalls, few, if any, dive sticks should be currently on the market; (2) redesigning products to comply with the rule should be fairly simple; and (3) substitute products are readily available.[1,8]

L. Proposed Findings

For the Commission to issue a rule under section 2(q) (1) of the FHSA classifying a substance or article as a banned hazardous substance, the Commission must make certain findings and include these findings in the regulation. 15

U.S.C. 1262(i)(2). The Commission proposes the following findings.

Voluntary standard. The FHSA requires the Commission to make certain findings concerning compliance with and adequacy of a voluntary standard if a relevant voluntary standard has been adopted and implemented. Id. The Commission is not aware of any voluntary standards addressing the risk of injury posed by dive sticks. Therefore, no findings concerning voluntary standards are necessary.

Relationship of benefits to costs. The FHSA requires the Commission to find that the benefits expected from a regulation bear a reasonable relationship to its costs. The Commission estimates the potential benefits of removing hazardous dive sticks from the market to be 2 to 4 cents per dive stick. With the availability of substitutes and the expected low cost of modifying dive sticks to conform to the proposed rule, the Commission anticipates that necessary changes will be minimal. The Commission estimates that the costs of the rule will be no more than 2 to 4 cents per dive stick. Thus, the Commission proposes to find that there is a reasonable relationship between the expected benefits of the rule and its costs.

Least burdensome requirement. The FHSA requires the Commission to find that a regulation imposes the least burdensome alternative that would adequately reduce the risk

of injury. Id. The Commission considered pursuing voluntary recalls, following a voluntary standard, or requiring labeling. A banning rule would be more effective than case-by-case recalls because the impalement hazard affects all dive sticks, not a specific brand or model. Awaiting recalls would allow these hazardous items on the market until the Commission obtained recalls. As explained above, no applicable voluntary standard exists, and compliance may be low if one did. Although labeling could help reduce the risk of injuries from dive sticks, it would be less effective than a banning rule. It may be difficult for a label to convey the necessary information at the time of use. Thus, the Commission proposes that a ban of dive sticks with the hazardous characteristics it has identified is the least burdensome alternative that would adequately reduce the risk of injury.

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 stated above, the Commission preliminarily concludes that the dive sticks described in the proposed rule are hazardous substances under section 2(f)(1)(D) of the FHSA. They are intended for children and

present a mechanical hazard because their design or manufacture presents an unreasonable risk of injury. 15 U.S.C. 1261(s). Therefore, the Commission proposes to amend title 16 of the Code of Federal Regulations as follows:

PART 1500 -- HAZARDOUS SUBSTANCES AND ARTICLES:

ADMINISTRATION AND ENFORCEMENT REGULATIONS

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

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

2. Section 1500.18 is amended to add a new paragraph (a)(18) to read as follows:

§ 1500.18 Banned toys and other banned articles intended for use by children.

(a) * * *

(18) Dive sticks, and other similar articles, that are used in swimming pools or other water environments for such activities as underwater retrieval games or swimming instruction, and which, when placed in the water, submerge and rest at the bottom of the pool. This includes products that are pre-weighted to sink to the bottom and products that are designed to allow the user to adjust the weight. Dive sticks and similar articles that come to rest

underwater at an angle greater than 45 degrees from vertical when measured under the test at § 1500.86(a)(7) and dive sticks and similar articles that maintain a compressive force of less than 5-lbf under the test at § 1500.86(a)(8) are exempt from this banning rule. Articles that have a continuous circular shape, such as dive rings and dive disks are also exempt.

3. Section 1500.86 is amended to add new paragraphs (a)(7) and (8) to read as follows:

§ 1500.86 Exemptions from classification as a banned toy or other banned article for use by children.

(a) * * *

(7) Dive sticks and similar articles described in § 1500.18(a)(18) that come to rest at the bottom of a container of water in a position in which the long axis of the article is greater than 45 degrees from vertical when measured in accordance with the following test method:

(i) Test equipment

(A) A container that is filled with tap water to a depth at least 3 inches [76 mm] greater than the longest dimension of the dive stick. The container shall: (1) be sufficiently wide to allow the dive stick to lie along the bottom with its long axis in a horizontal position, (2) have clear side

walls to permit observation of the dive stick under water, and (3) be placed on a level surface and have a flat bottom.

(B) A protractor or other suitable angle measurement device that has an indicator for 45 degrees from vertical.

(ii) Testing procedure

(A) If the dive stick is sold such that the consumer is required to attach an additional component(s) to the dive stick, then the product shall be tested both with and without the attachment(s).

(B) From just above the water surface, drop the dive stick into the container.

(C) Let the dive stick sink and come to rest at the bottom of the container. If the dive stick is designed so that the weight can be adjusted by adding water or other substance, adjust the weight so that the dive stick sinks and comes to rest with its long axis positioned as close to vertical as possible.

(D) Align the angle measurement device alongside the dive stick underwater and wait for the dive stick to come to rest if there is any water disturbance. Determine whether the long axis of the dive stick is greater than or less than 45 degrees from vertical.

(8) Dive sticks and similar articles described in § 1500.18(a)(18) in which the maximum force measured in the following test method is less than 5-lbf [22N]. The test

shall be conducted in the ambient environment of the laboratory and not under water.

(i) Test equipment

(A) A compression rig that has a force gauge or equivalent device that is calibrated for force measurements within a minimum range of 0 to 5 lbf [0-22 N] and with an accuracy of +/- 0.1 lbf [+/- 0.44 N] or better. The test rig shall have a system to guide this force application in the vertical direction and shall have a means to adjust the rate of load application.

(B) Compression disk -- the loading device that is attached to the force gauge shall be a rigid metal disk with a minimum diameter of 1.125 inches [29 mm].

(C) Vise or other clamping device.

(ii) Testing procedure

(A) Position the bottom of the dive stick in the clamping device so that the longest axis of the dive stick is vertical. The bottom end of the dive stick is the end that sinks to the bottom of a pool of water. Secure the bottom of the dive stick in the clamp such that the clamping mechanism covers no more than the bottom 1/2 inch [13 mm] of the dive stick.

(B) Apply a downward force at a rate of 0.05 in/sec (+/- 0.01 in/sec) [1.3 mm/sec +/- 0.3 mm/sec] at the top of the dive stick with the compression disk positioned so that the

plane of the disk contact surface is perpendicular to the long axis of the dive stick.

(C) Apply the load for a period of 40 seconds or until the maximum recorded force exceeds 5-lbf [22 N].

(D) Record the maximum force that was measured during the test.

Dated: _____

Sadye E. Dunn, Secretary
Consumer Product Safety Commission

List of Relevant Documents

1. Briefing memorandum from Ronald Medford, AED, Office of Hazard Identification and Reduction and Scott Heh, Project Manager, Directorate for Engineering Sciences, to the Commission, "Dive Sticks," _____, 2000.

2. Memorandum from Debra Sweet, Directorate for Epidemiology, to Scott Heh, Project Manager, "Injury Data Related to Dive Sticks," March 21, 2000.

3. Memorandum from Catherine A. Sedney, Division of Human Factors, to Scott Heh, Project Manager, "Human Factors Assessment of Dive Sticks," April 10, 2000.

4. Comment Received in Response to the ANPR, Steve Hutchison, Department of Fair Trading, NSW Consumer Protection Agency, Australia, dated August 30, 1999.

5. Memorandum from Scott Heh, Project Manager, to File, "Banning Definition and Test Methods for Dive Sticks," May 3, 2000.

6. Memorandum from Catherine A. Sedney, Division of Human Factors, to Scott Heh, Project Manager, "Prevention of

Impalement Injuries: Specification of the Position of Dive Sticks in Water," January 27, 2000.

7. Memorandum from Suad Nakamura, Ph.D., Physiologist, Division of Health Sciences, and Scott Heh, Mechanical Engineer, Directorate for Engineering Sciences, to File, "Development of an Exemption for Non-rigid Dive Sticks," May 3, 2000.

8. Memorandum from Robert Franklin, Economist, Directorate for Economic Analysis, to Scott Heh, Project Manager, "Preliminary Regulatory Analysis: Dive Sticks," May 18, 2000.