Tipover/Collapse

In 24 incidents, children were fatally injured when playground equipment either tipped over or collapsed. In some cases, the equipment was not anchored to the ground or was not anchored properly. In other cases, the equipment broke or disengaged, hitting the victim. Swing sets were the type of equipment most frequently reported in these incidents. In 11 cases, the equipment was reported to be homemade, although in some cases, this information was not known.

Entrapment

Of the 147 deaths, 3 resulted from a child's head or neck becoming entrapped in the equipment. One death occurred when a child became entrapped between the horizontal rungs of a ladder. The second case involved a child who became entrapped between the leg support and slide of home playground equipment. The third incident involved a child who was wearing a bicycle helmet that became wedged in a gap between two platforms.

Impact

There were three fatalities that involved impact with a moving component of playground equipment. All involved a head injury. The deaths involved being struck by a rotating passenger compartment; an animal swing, and a homemade swing.

Other/Unknown

Four deaths were included in this category. In one case, a 13-year-old boy was lying in a ball pit at a pay-for-play establishment and other teenagers who went down a slide landed on top of him. In another case, a child died from aspiration of gravel from a school playground. In two cases, details about the circumstances involved in the death were not available.

1988 PLAYGROUND STUDY

Comparison of the findings from the current study to those from a 1988 CPSC study of playground hazards[1] revealed a few notable similarities and differences. Population-based rates of injury for both time periods were comparable.

Public equipment continues to be associated with the greatest proportion of injuries, 76 percent in the current study as compared to 70 percent in 1988. Locations in which these injuries occurred, however, appear to have shifted somewhat. In the current study, about 45 percent of the injuries involving public equipment occurred in schools, 31 percent occurred in public parks, and 24 percent occurred in other locations. In 1988, however, about 42 percent of the injuries occurred both in schools and in public parks, and 16 percent occurred in other locations.

During both time periods, climbers accounted for the greatest proportion of injuries on public equipment (Table 9). The proportion of injuries involving climbers in public locations increased from 32 percent in 1988 to 53 percent in the current study. The proportions of injuries associated with slides, swings, and other public equipment declined somewhat. On home equipment, swings and swing sets continued to be associated with the greatest proportion of injuries.

Table 9.

Playground Equipment-Related Injuries Treated in U.S. Hospital Emergency Rooms, Home & Public Equipment /Hazard Patterns from 1988 & 1999/2000 CPSC Studies

Equipment & Hazard Pattern	1988 Study		1998/1999 Study	
	Home	Public	Home	Public
Total	100%[1]	100%	100%	100%
Climbers	31%	32%	12%	53%
Slides	4%	29%	15%	17%
Swings	60%	26%	67%	19%
Other	5%	13%	6%	11%
Falls	73%	74%	81%	79%
Impact	22%	18%	6%	11%
Other	6%	7%	13%	10%

[1] Column detail may not add to total due to rounding.

Source: National Electronic Injury Surveillance System (NEISS),
4/1/88-12/31/88, 11/1/98 – 10/31/99
U.S. Consumer Product Safety Commission/EPHA

In the current study, substantial proportions of the injuries occurred on multi-use structures, about 30 percent of the injuries on home equipment and about 40 percent of the injuries that occurred on public equipment. Information on the specific proportions of home and public multi-use structures was not presented in the 1988 study, although these structures were less common at that time. For both time periods, however, the multi-use aspects of the equipment did not appear to be causal factors in the injuries that occurred.

Falls accounted for about 81 percent of the injuries on home equipment and 79 percent of the injuries on public equipment, in the current study (Table 9). In 1988, falls accounted for 73 and 74 percent of the injuries on home and public equipment, respectively. It is possible that the increased proportion of injuries attributable to falls in recent years may actually be a reflection of a reduction of other hazards such as impact with moving or stationary equipment; contact with hardware, pinch points, sharp edges; etc.

In the current study, about 79 percent of the equipment in public locations was installed over protective surfacing. In 1988, only about 36 percent of the surfaces under public equipment were protective. During both time periods, the surfacing under home equipment was predominantly dirt or grass. It is encouraging that the proportion of public playgrounds having protective surfacing appears to have increased in recent years.

Since the 1988 study, deaths from swing impact appear to have almost disappeared. Strangulation due to entanglement on ropes, shoestrings, cords, leashes, clothing strings, and similar items continues to be the most common scenario involved in fatal playground incidents. The majority of fall-related deaths continue to be related to head injury, although generally not on recommended surfaces.

Reasons for the differences between the two time periods may be related to changes in exposure (e.g., increased use of after-school programs, commercial daycare, etc.); improved construction and materials (e.g., fewer sharp edges, protruding hardware components, heavy swings, etc); changes in equipment types (e.g., more multi-use structures, fewer swings and merry-go-rounds, etc.); and increased recognition of hazards (importance of protective surfaces, improved layout, etc.).

IV. CONCLUSIONS AND RECOMMENDATIONS

Fall-related injuries continue to account for more injuries on playground equipment than any other hazard scenario. Reported fall-related deaths most often involved head injury. Actions taken to address severe head injuries from falls include the development of the CPSC Handbook for Public Playground Safety, which includes guidelines on protective surfacing, and an ASTM safety standard, which provides a test method to evaluate the impact attenuation of playground surfaces. While serious head injuries (i.e., fractures, concussions, and internal injuries) accounted for only a small portion of the fall-related injuries in this study, adequate protective surfaces were not present in most of the serious cases. Particularly since death may occur, the installation and maintenance of appropriate protective surfaces are important in reducing the risk of severe head injury. It is encouraging that the proportion of public playgrounds having protective surfacing has increased in recent years. However, home equipment continues to be installed over dirt and grass, surfaces which do not offer much protection against serious head injuries.

CPSC developed the recommendations for protective surfacing on playgrounds to address the risk of serious head injury. The effectiveness of various safety surfaces in reducing the frequency and severity of other fall-related injuries is not known, and may be an area for future research. Fractures of the hand and arm, particularly the wrist, lower arm, and elbow, were the most common injuries treated in hospital emergency rooms during the special study time period. While generally not life-threatening, these injuries can nevertheless be debilitating and may have long-term consequences. Most of the hospitalized injuries involved serious fall-related fractures of the hand and arm.

A number of recommendations in the CPSC Handbook and the ASTM standards address fall hazards through modification of the equipment, such as with guardrails and barriers. However, for specific equipment types, additional consideration may need to be given to the ages and skill levels of the intended users. For climbers especially, fall-related injuries were common, particularly with overhead equipment such as horizontal ladders. While four-year-olds are generally the youngest children capable of using upper body equipment, perhaps some equipment configurations are difficult even for older children to negotiate successfully.

With regard to playground equipment-related deaths, hanging and fall-related deaths continue to be the most common hazard scenarios. While installation and maintenance of appropriate protective surfacing and certain equipment modifications may address most of the fatal fall incidents, hanging deaths remain problematic. Voluntary ASTM standards and CPSC guidelines for playground equipment and children's clothing drawstrings have addressed some aspects of clothing entanglement.[6, 7, 8, 11, 12] However, children have also become entangled in other items that were not designed to be part of the equipment (e.g., ropes, cords, leashes, etc.) or were homemade (e.g., rope swings). To consumers, this may be a "hidden hazard."

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11. American Society for Testing and Materials. *ASTM F 1816 Standard Safety Specification for Drawstrings on Children's Upper Outerwear.* West Conshohocken, PA: American Society for Testing and Materials, 1997.

12. *Guidelines for Drawstrings on Children's Outerwear.* Washington, D.C.: U.S. Consumer Product Safety Commission, 1996.

APPENDIX

Table A1. Injuries Associated with Public Playground Equipment,
Type of Equipment by Hazard Pattern

Type of Equipment	Hazard Pattern						
	Total	Falls to Surface	Falls to Equipment	Falls to Unk Surface	Impact, Moving Equipment	Impact, Stationary Equipment	Other, Unknown
Total	100%[1,2] (100%)[3]	100% (68%)	100% (10%)	100% (1%)	100% (3%)	100% (8%)	100% (10%)
Climbers	53% (100%)	55% (70%)	77% (14%)	68% (2%)	0% (0%)	58% (9%)	29% (5%)
Swings	19% (100%)	21% (76%)	5% (3%)	21% (1%)	69% (12%)	4% (2%)	11% (5%)
Slides	17% (100%)	16% (65%)	6% (4%)	6% (<1%)	0% (0%)	10% (5%)	45% (26%)
See-Saws	3% (100%)	2% (48%)	0% (0%)	0% (0%)	27% (27%)	10% (23%)	<1% (2%)
Merry-Go-Rounds	1% (100%)	<1% (31%)	2% (19%)	0% (0%)	0% (0%)	0% (0%)	5% (50%)
Other	7% (100%)	5% (52%)	9% (13%)	5% (1%)	4% (2%)	18% (20%)	9% (12%)

[1] Detail may not add to total due to independent rounding.
[2] Upper percents sum vertically.
[3] Lower percents sum horizontally.

Source: National Electronic Injury Surveillance System (NEISS), 11/1/98 – 10 /31/99
U.S. Consumer Product Safety Commission/EPHA

Table A2. Injuries Associated with Public Playground Equipment,
Age of Victim by Hazard Pattern

Age of Victim (Years)	Hazard Pattern						
	Total	Falls to Surface	Falls to Equipment	Falls to Unk Surface	Impact, Moving Equipment	Impact, Stationary Equipment	Other, Unknown
Total	100%[1,2] (100%)[3]	100% (68%)	100% (10%)	100% (1%)	100% (3%)	100% (8%)	100% (10%)
< 2	3% (100%)	2% (48%)	2% (7%)	0% (0%)	2% (2%)	0% (0%)	14% (43%)
2 – 4	24% (100%)	21% (63%)	30% (13%)	16% (<1%)	7% (1%)	23% (8%)	41% (15%)
5 – 9	55% (100%)	61% (74%)	57% (10%)	10% (<1%)	36% (2%)	59% (9%)	20% (5%)
10 – 12	15% (100%)	16% (70%)	11% (7%)	6% (<1%)	7% (2%)	10% (5%)	26% (15%)
13 – 14	3% (100%)	0% (0%)	0% (0%)	68% (27%)	47% (52%)	8% (22%)	0% (0%)

[1] Detail may not add to total due to independent rounding.
[2] Upper percents sum vertically.
[3] Lower percents sum horizontally.

Source: National Electronic Injury Surveillance System (NEISS), 11/1/98 – 10 /31/99
U.S. Consumer Product Safety Commission/EPHA

Table A3. Injuries Associated with Public Playground Equipment,
Age of Victim by Type of Equipment

Age of Victim (Years)	Type of Equipment						
	Total	Climbers	Swings	Slides	See-Saws	Merry-Go-Rounds	Other
Total	100%[1,2] (100%)[3]	100% (53%)	100% (19%)	100% (17%)	100% (3%)	100% (1%)	100% (7%)
< 2	3% (100%)	0% (0%)	2% (10%)	11% (64%)	4% (4%)	63% (21%)	0% (0%)
2 – 4	24% (100%)	21% (45%)	8% (6%)	40% (29%)	0% (0%)	25% (1%)	58% (19%)
5 – 9	55% (100%)	65% (60%)	53% (18%)	42% (13%)	66% (4%)	12% (<1%)	29% (4%)
10 – 12	15% (100%)	12% (41%)	30% (38%)	7% (8%)	31% (7%)	0% (0%)	13% (7%)
13 – 14	3% (100%)	3% (48%)	8% (52%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)

[1] Detail may not add to total due to independent rounding.
[2] Upper percents sum vertically.
[3] Lower percents sum horizontally.

Source: National Electronic Injury Surveillance System (NEISS), 11/1/98 – 10 /31/99
U.S. Consumer Product Safety Commission/EPHA

Table A4. Injuries Associated with Home Playground Equipment,
Type of Equipment by Hazard Pattern

Type of Equipment	Hazard Pattern					
	Total	Falls to Surface	Falls to Equipment	Falls to Unk Surface	Impact, Moving Equipment	Other, Unknown
Total	100%[1,2] (100%)[3]	100% (69%)	100% (10%)	100% (2%)	100% (6%)	100% (13%)
Climbers	12% (100%)	12% (66%)	41% (34%)	0% (0%)	0% (0%)	0% (0%)
Slides	15% (100%)	13% (62%)	30% (20%)	0% (0%)	0% (0%)	26% (18%)
Swings	67% (100%)	71% (73%)	2% (<1%)	100% (3%)	100% (9%)	74% (14%)
Other	6% (100%)	5% (54%)	27% (46%)	0% (0%)	0% (0%)	0% (0%)

[1] Detail may not add to total due to independent rounding.
[2] Upper percents sum vertically.
[3] Lower percents sum horizontally.

Source: National Electronic Injury Surveillance System (NEISS), 11/1/98 – 10 /31/99
U.S. Consumer Product Safety Commission/EPHA

Table A5. Injuries Associated with Home Playground Equipment,
Age of Victim by Hazard Pattern

Age of Victim (Years)	Hazard Pattern					
	Total	Falls to Surface	Falls to Equipment	Falls to Unk Surface	Impact, Moving Equipment	Other Unknown
Total	100%[1,2] (100%)[3]	100% (69%)	100% (10%)	100% (2%)	100% (6%)	100% (13%)
< 2	5% (100%)	3% (46%)	0% (0%)	0% (0%)	7% (8%)	17% (46%)
2 – 4	37% (100%)	36% (68%)	35% (10%)	0% (0%)	47% (7%)	45% (16%)
5 – 9	57% (100%)	59% (72%)	65% (11%)	100% (4%)	46% (5%)	33% (8%)
10 – 12	1% (100%)	2% (100%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)
13 – 14	<1% (100%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	5% (100%)

[1] Detail may not add to total due to independent rounding.
[2] Upper percents sum vertically.
[3] Lower percents sum horizontally.

Source: National Electronic Injury Surveillance System (NEISS), 11/1/98 – 10 /31/99
U.S. Consumer Product Safety Commission/EPHA

Table A6. Injuries Associated with Home Playground Equipment,
Age of Victim by Type of Equipment

Age of Victim (Years)	Type of Equipment				
	Total	Climbers	Slides	Swings	Other
Total	100%[1,2] (100%)[3]	100% (12%)	100% (15%)	100% (67%)	100% (6%)
< 2	5% (100%)	5% (13%)	7% (23%)	4% (63%)	0% (0%)
2 – 4	37% (100%)	34% (11%)	38% (15%)	36% (65%)	54% (8%)
5 – 9	57% (100%)	60% (13%)	51% (14%)	58% (69%)	46% (5%)
10 – 12	1% (100%)	0% (0%)	0% (0%)	2% (100%)	0% (0%)
13 – 14	1% (100%)	0% (0%)	4% (100%)	0% (0%)	0% (0%)

[1] Detail may not add to total due to independent rounding.
[2] Upper percents sum vertically.
[3] Lower percents sum horizontally.

Source: National Electronic Injury Surveillance System (NEISS), 11/1/98 – 10 /31/99
U.S. Consumer Product Safety Commission/EPHA

TAB B

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: OCT 12 2001

TO : Scott Heh, Project Manager,
Petition on Home Playground Equipment

THROUGH: Sue Ahmed, Ph.D, Associate Executive Director SA
Directorate for Epidemiology
Russ Roegner, Ph.D, Division Director RR
Division of Hazard Analysis

FROM : Debra Sweet,
Division of Hazard Analysis

SUBJECT : Home Playground Equipment Petition HP 93-1 -- Swing Impact Injuries and Deaths

This memo was prepared in response to Petition HP 93-1, Petition on Home Playground Equipment. The memo includes information on swing impact injuries from January 1995 through December 2000. Information is included on swing impact-related fatalities dating back to January 1973.

The search criteria for both deaths and injuries were: product codes 3246 (swings or swing sets), 3219 (other playground equipment), and 3273 (playground equipment, not specified); NEISS disposition codes 2,4,5, and 8; victim ages 1 month to 14 years; injury dates 1/1/1995 through 12/31/2000. The NEISS disposition codes were used to distinguish serious injuries, those injuries in which the children were treated and transferred, treated and held for observation, or treated and admitted.

Injuries that were a result of impact after the playground equipment broke were not included in this memo.

Background

The petition included a request to ban playground equipment that did not adhere to any of nine specific circumstances. Four of the nine requests by the petitioner were denied in March 1996. The Commission deferred a decision on the remaining 5 requests until the ASTM Subcommittee for Home Playground Equipment responded to CPSC staff requests for revisions to the existing voluntary standard. The subcommittee agreed on and incorporated revisions for four of CPSC's requests. The outstanding issue is that of swing impact.

Deaths

Since 1990, CPSC has received a report of one death associated with swing impact. In 1994, a 6-year-old boy was struck in the head by a large metal animal swing. The swing was a straddle-type, single-occupancy swing located at his school playground. CPSC does not have reports of any deaths from impact with a multiple-occupancy swing, with either public or home equipment.

The Commission also received information on 16 deaths from 1973 through 1989 resulting from impact with a moving swing.[1] Details about circumstances, location and type of swing involved were usually not available. At least six of these deaths were reported to have happened on home playground equipment. Two of the home deaths involved multiple occupancy swings. In the first incident, a 12-month-old female was struck in the face by a glider on a swing set. The other incident involved a 22-month-old boy who died after he was struck by a multiple occupancy lawn swing, one of many activities on the piece of home playground equipment. It is unknown if the multiple occupancy swings, or any of the swings involved in fatal incidents, were occupied when the child was struck.

Serious Injuries

From January 1995 through December 2000, the Commission learned of one child who was seriously injured when hit by a swing in a home environment. The victim was a 2-year-old girl who received a laceration to an eyeball and the eyelid when she was hit by a swing. The NEISS record did not give sufficient information to know if this was a multiple-occupancy or single-person swing. The girl was treated and admitted to the hospital for her injuries.

In addition to this single serious incident in a home environment, staff has reports of 12 incidents of serious injury where the location is unknown. Table 1 (attached) summarizes these incidents. There is not sufficient information in the narratives of the incidents to distinguish whether the playground equipment involved was home equipment or public equipment.

Emergency Room Treated Injuries

In 2000, an estimated 2,400 children were treated in an emergency room as a result of swing impact from home playground equipment. Of the sample of incidents from NEISS, one narrative stated that the swing was a two-person swing. In this incident, the 6-year-old victim received lacerations to the mouth when hit by the swing. The occupancy of the swings in the remaining incidents is unknown. All but one child in the sample were treated and released from the emergency room. The one remaining child, a 23-month-old child, was treated and admitted for the injuries received.

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[1] Tinsworth, Deborah Kale, and John T. Kramer. "Playground Equipment-Related Injuries and Deaths." U.S. Consumer Product Safety Commission, Directorate for Epidemiology. April 1990.

Table 1: Serious Injuries from Swing Impact in which Incident Location is Unknown

Document Number	Incident Date	Victim Age/Sex	Injury	Scenario
NEISS	5/27/1998	13 years/ Female	Concussion	Victim was hit in the head with a swing.
NEISS	7/18/1999	11 years/ Male	Internal Organ Injury to the Head	Victim was hit in the head with a swing.
NEISS	7/18/1999	11 years/ Male	Internal Organ Injury to the Head	Victim was hit in the head with a swing.
NEISS	8/19/1999	2 years/ Female	Internal Organ Injury to the Head	Victim was hit by a swing on the side of the head.
NEISS	3/14/2000	21 months/ Male	Other Injuries to All Parts of the Body	Victim was hit on the head with a swing and appears weak and "spacing off."
NEISS	9/12/2000	13 months/ Male	Hematoma on the Face	Victim was hit in the face with a swing twice.
NEISS	9/22/2000	2 years/ Female	Forehead Laceration and Concussion	Victim was struck by unoccupied swing pushed by another child.
P9714730A	7/19/1995	10 years/ Female	Concussion	Victim was struck in the head by a swing.
P9715567A	6/18/1995	7 years/ Female	Brain Injury	Victim was hit in the head with a swing.
P9715635A	4/13/1995	8 years/ Male	Concussion	Victim was hit in the head with a swing.
P9716158A	5/6/1995	9 years/ Female	Injury to Gastrointestinal Tract	Victim jumped off the swing, swing came back and struck the victim.
P9716386A	4/27/1995	6 years/ Male	Intracranial Injury of Other/ Unspecified Nature	Victim was hit in the head with a swing.

Source: IPII, NEISS, INDP, DTHS. Search dates were 1/1/1995 through 12/31/2000, NEISS dispositions 2, 4, 5 and 8. Product codes used were 3246, 3219 and 3273.

TAB C

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: October 11, 2001

To : File

Through : Hugh McLaurin, Associate Executive Director
Directorate for Engineering Sciences
Nick Marchica, Director, Division of Mechanical Engineering

From : Scott Heh, Backyard Playset Project Manager, Division of Mechanical Engineering,
Ext. 1308

Subject: ASTM Standard Actions for Home Playground Equipment

On March 28, 1996, the Commission voted unanimously to deny four requests in petition HP 93-01, submitted by the New York City Department of Consumer Affairs, that sought a ban of backyard play sets if they did not meet certain safety requirements. At that time, the Commission also voted to defer a decision on the petitioner's five additional requests until the ASTM Subcommittee for Home Playground Equipment responded to a U.S. Consumer Product Safety Commission (CPSC) staff request to revise the ASTM Standard for Home Playground Equipment (ASTM F1148).

In 1997, the ASTM Home Playground Subcommittee approved revisions to the ASTM standard that address four of the five open items on the Backyard Playset Petition. The CPSC technical staff's opinion is that the revisions to the ASTM Home Playground Equipment Standard adequately address four of the five open petition issues. These revisions are published in the 1998 version of the F1148 standard and are summarized below.

Issue 1. Ban play sets that do not clearly and conspicuously direct consumers to use and maintain adequate ground surfacing.

ASTM action: ASTM revised the standard to require that a CPSC consumer information sheet for playground surfacing materials accompany the play set manual/instructions (Attachment 1).

Issue 2. Ban Play sets that do not have handrails (guardrails) on all platforms at least 30 inches above the protective surfacing.

ASTM action: ASTM revised the standard to add guardrail requirements for platforms higher than 30 inches and protective barrier requirements for platforms higher than 48 inches. The guardrail height shall be 25 inches or more. The protective barrier height shall be at least 27 inches on platforms that are between 48 and 72 inches in height. For platforms higher than 72 inches, the protective barrier height shall be at least 33 inches high.

Issue 3. Ban Play Sets that have free-swinging rope swings.

ASTM action: ASTM revised the standard to add a requirement that ropes be secured at both ends to prevent the rope from being looped back on itself in a manner that could create a strangulation hazard.

ASTM also added a provision to include in the play set operating instructions a warning against attaching items such as jump ropes, clothesline, pet leashes, cables, and chain as they may cause a strangulation hazard.

Issue 4. Ban play sets that do not require the play set to be anchored into the ground if the play set includes one or more swings.

ASTM action: The ASTM standard already has a swing set stability test provision. It requires that each swing position be loaded and swung in unison while the play set is placed on a 5-degree slope. Subcommittee discussion of this issue led to a conclusion that anchoring is not necessary for all swing sets, given the existing stability performance requirement, and that some backyard play sets are so massive that tipover will not occur due to the presence of swings.

ASTM revised the standard to include new labeling requirements for the shipping carton, the instructions, the point of purchase display, and the promotional materials. If a manufacturer recommends that a play set be anchored, then the play set must include detailed instructions on how to anchor and how to get the anchors.

Swing Impact

The petitioner's remaining request was to ban play sets with swing seats made of wood, metal, plastic or any other hard and heavy material capable of inflicting a serious injury to a child. The ASTM Home Playground Equipment Subcommittee has not proposed revisions to the standard to address this petitioner concern.

The ASTM standard already has impact requirements for unoccupied single-person swings. The purpose of the current requirement is to protect against serious head injury and death if a child gets struck in the head by an unoccupied single-occupancy swing. Multiple–occupancy swings and straddle-type seats, such as a horse, are not subject to impact requirements.

When requested by CPSC staff to consider impact requirements on all swings, including multiple occupancy swings, the ASTM Home Playground Subcommittee voted (1996) against the request. The Subcommittee asserted that the test currently in the standard requires that it be

performed on an unoccupied swing since it was primarily developed to address incidents in which children were struck while they were either swinging empty swings or were struck after deliberately jumping from a swing. The Subcommittee did not believe these to be likely play patterns in incidents involving impact by multiple-occupancy swings or straddle-type single-person swings on home play sets. Further, they did not believe that available incident data showed a need for multiple occupancy and straddle swing impact requirements.

CONSUMER INFORMATION SHEET FOR PLAYGROUND SURFACING MATERIALS[1]

The U.S. Consumer Product Safety Commission (CPSC) estimates that about 100,000 playground equipment-related injuries resulting from falls to the ground surface are treated annually in U.S. hospital emergency rooms. Injuries involving this hazard pattern tend to be among the most serious of all playground injuries, and have the potential to be fatal, particularly when the injury is to the head. The surface under and around playground equipment can be a major factor in determining the injury-causing potential of a fall. It is self evident that a fall onto a shock absorbing surface is less likely to cause a serious injury than a fall onto a hard surface. Playground equipment should never be placed on hard surfaces such as concrete or asphalt and while grass may appear to be acceptable it may quickly turn to hard packed earth in areas of high traffic. Shredded bark mulch, wood chips, fine sand or fine gravel are considered to be acceptable shock absorbing surfaces when installed and maintained at a sufficient depth under and around playground equipment.

The following table lists the maximum height from which a child would not be expected to sustain a life-threatening head injury in a fall onto four different loose-fill surfacing materials if they are installed and maintained at depths of 6, 9, and 12 inches. However, it should be recognized that all injuries due to falls cannot be prevented no matter what surfacing material is used.

FALL HEIGHT IN FEET FROM WHICH A LIFE THREATENING HEAD INJURY WOULD NOT BE EXPECTED			
TYPE OF MATERIAL	6 INCH DEPTH	9 INCH DEPTH	12 INCH DEPTH
Double Shredded Bark Mulch	6	10	11
Wood Chips	6	7	12
Fine Sand	5	5	9
Fine Gravel	6	7	10

It is recommended that a shock absorbing material should extend a minimum of 6 feet in all directions from the perimeter of stationary equipment such as climbers and slides. However, because children may deliberately jump from a moving swing, the shock absorbing material should extend in the front and rear of a swing a minimum distance of 2 times the height of the pivot point measured from a point directly beneath the pivot on the supporting structure.

This information is intended to assist in comparing the relative shock-absorbing properties of various materials. No particular material is recommended over another. However, each material is only effective when properly maintained. Materials should be checked periodically and replenished to maintain correct depth as determined necessary for your equipment. The choice of a material depends on the type and height of the playground equipment, the availability of the material in your area, and its cost.

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[1]This information has been extracted from the CPSC publications "Playground Surfacing - Technical Information Guide" and "Handbook for Public Playground Safety." Copies of these reports can be obtained by sending a postcard to the: Office of Public Affairs, U.S. Consumer Product Safety Commission, Washington, D.C., 20207 or call the toll-free hotline: 1-800-638-2772.

TAB D

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: August 23, 2001

TO : Scott Heh, ES, Project Manager, Backyard Playset Petition

THROUGH: Warren J. Prunella, AED, EC

FROM : Mary F. Donaldson, EC

SUBJECT : Backyard Playset Petition, HP 93-01

This memo is in response to your request for updated information about the home playground equipment market. It provides an overview of the market for products that were the subject of Petition HP 93-01 from the New York City Department of Consumer Affairs to promulgate mandatory standards for private backyard play sets intended for children.

In 1996, the Commission voted to deny four requests of the Petitioner. It also voted to defer decision on five other requests of the Petitioner while awaiting the development of standards by the ASTM. Since 1996, ASTM has adopted voluntary standards that address hazards related to four of the five outstanding requests. The only remaining item which has not been addressed is the Petitioner's request to "ban play sets with swing seats made of wood, metal, plastic or any other hard and heavy material capable of inflicting a serious injury to a child".

The Characteristics of Playsets

Home playground equipment is produced and marketed in several broad and sometimes overlapping categories based on the main structural material. The basic categories are: wood playsets (including wood do-it-yourself kits), metal playsets, and plastic playsets. Home playground equipment may include single element play structures, such as a swing or set of swings, or more commonly, "playsets" which include more than one type of play element or activity, such as swings and a slide. Wood playsets are often modular in structure, which allows for customizing the play structure with a variety of play elements.

Almost all playsets are sold with swings. Additionally, multiple occupancy swings are on practically all metal playsets and some wood playsets. A multiple occupancy swing is defined as a swinging apparatus that is attached to backyard playsets and designed to hold two or more persons, usually children. Multiple occupancy swings include lawn swings and glide rides. Lawn swings are built for two, and sometimes four, children. The children ride facing each other on bench type seats. Glide rides allow two children to ride facing one another on tractor type seats or, sometimes, seated back-to-back. Generally, multiple occupancy swings consist of metal

structural members and plastic seating components. In addition, some manufacturers include, on their playsets, multiple occupancy lawn swings, similar to porch swings, which are made of metal or wood and can be used by adults.

Metal Playsets

Metal playsets may account for about 60 to 70 percent of metal and wood units sold today, based on information obtained from industry representatives and during a 1999 voluntary standards conformance monitoring study conducted by the Office of Compliance. Hedstrom dominates the playset market in terms of unit sales. In its annual 10-K filing for 1998[1], Hedstrom indicated that it had over 80% of the metal swingset market. Hedstrom's only major competitor in this category is Flexible Flyer. Metal playsets range in price from about $100 to $200.

Wood Playsets

Based on the Compliance monitoring study and information obtained from industry representatives, wood playsets may represent about 30 to 40 percent of metal and wood playsets sold today. Among the manufacturers of home playground equipment, the wood playset category includes the largest number of firms. Playcore[2] and Creative Playthings are dominant manufacturers. Playcore's major product line is wood do-it-yourself kits sold under the Swing N Slide brand. (Wood do-it-yourself kits are sold with everything necessary to create the playset except the lumber.) Creative Playthings' major product line is complete wood sets. Other national manufacturers include Hedstrom (Backyard Products LTD subsidiary), Backyard Adventures, GYM*N*I, Rainbow Play Systems, Childlife, Leisure Time Products, Woodlawn Playcenters, and Cedarworks of Maine. Additionally there are an unknown number of smaller playset manufacturers that produce for regional markets. Wood playsets and playset kits range in price from several hundreds of dollars to thousands of dollars.

Plastic Playsets

Plastic playsets represent the third category of backyard play equipment. While sales of plastic playsets are not known, they probably account for less than 10 percent of the playset market. Some plastic playsets are portable and small enough to be moved and used indoors. Unlike metal and wood playsets, many plastic playsets do not have swings. Instead they usually have climb and crawl through activities along with a platform that leads to a slide. Currently, three firms dominate this category, which focuses on play for younger children. They are: Step2,

[1] This is the most recent 10-K report available.

[2]In its annual 10-K filing with the Securities and Exchange Commission, Playcore indicated that its major competitor was Hedstrom, a metal playset manufacturer that has recently started producing wood playsets and wood do-it-yourself kits.

Little Tikes and Hedstrom. Fisher-Price produced play equipment in this category until several years ago. Plastic play equipment ranges in price from about $50 for a single activity item such as a slide to around $750 for a large multi-activity playset.

Distribution Channels

Home playground equipment is distributed through traditional retail channels. These include mass merchandise retailers such as Kmart, Target, and Wal-Mart, toy stores such as Toys R Us, hardware stores, and home project center stores.

Wood do-it-yourself kits are sold, almost exclusively, where lumber is sold since wood do-it-yourself kits do not include lumber. Instead, they include a list of lumber pieces needed to create the playset.

Higher end (several thousand dollars and up) wooden playsets are often sold through small dealers, small retailers, custom outdoor structure design firms, or direct to consumers through mail order.

Besides these traditional channels, home playground equipment is increasingly available direct from the manufacturer. Customers are reached through advertisements by mail, on the Internet, and in local and national publications.

Shipments of Home Playground Equipment

Some national data are available on backyard play set production and sales. At the time of the original petition in 1993, the Home Playground Manufacturing Group, which represented companies that manufactured 95 percent of the units sold, estimated that a total of one million backyard play sets were sold in the United States annually.[3] In the course of the 1999 voluntary standards conformance monitoring study conducted by the Office of Compliance, information on playset sales was obtained from 28 of 32 manufacturers studied. The 32 firms selected for Compliance's study included the major national producers as well as a sample of smaller producers. The 28 firms reported annual sales of about 1,060,000 wood and metal units, with 97 percent of sales attributed to the top five producers who reported sales.

In addition, the U.S. Bureau of Census reports manufacturers' 'value of shipments' information for playground equipment in the Census of Manufactures, which is conducted every five years. The home playground equipment category includes items such as swingsets, slides, seesaws, and sandboxes. Table 1 shows 'value of shipments' information for the census years since 1977. For these years, the average value of shipments for home playground equipment was 58 percent of the total value of shipments in the playground category.

[3]See December 15, 1993, letter from Locker Greenberg & Brainin, P.C. to the CPSC Office of the Secretary, re: Petition H.P. 93-1 for Issuance of Backyard Playset Standards.

Table 1: Value of Shipments, SIC 3949, in millions of dollars, 1977 - 1997.

Year	Home Playground
1977	$ 57.2
1982	$ 85.3
1987	$123.2
1992	$226.4
1997	$334.8

Source: U.S. Bureau of the Census

Based on the estimate of one million backyard play sets sold per year and an assumed product life of about five to seven years, the CPSC's Product Population Model estimates that there may be approximately 6.3 million wood and metal units currently in use.

Consumer Exposure

About one in every 3.5 families with children ages 3 to 11 have a backyard playset. This is based on information from the U.S. Bureau of the Census indicating that there were 22 million families with children aged 3 to 11 in 1998 and a backyard playset population of about 6.3 million units.

TAB E

HOME PLAYGROUND EQUIPMENT

CONFORMANCE MONITORING

PROGRAM

Debra Sweet
Directorate for Epidemiology
June 12, 2001

I. INTRODUCTION

The U.S. Consumer Product Safety Commission (CPSC) staff conducted a conformance study to determine the extent to which the manufacturers adhere to the voluntary standard for home playground equipment.

ASTM standard F1148, "Standard Consumer Safety Performance Specification for Home Playground Equipment" was originally published in 1988 to reduce the likelihood of life-threatening or debilitating injuries that may occur on home playground equipment. Multiple revisions of the standard have been made since 1988 - the latest published in 1998 (ASTM F1148-98c). The standard is designed to address hazards on wood, metal, plastic and combination equipment.

II. METHODOLOGY

CPSC staff identified 32 home playground equipment manufacturers with both large- and small-scale production.

These 32 manufacturers are not all of the home playground equipment manufacturers in the continental United States, although staff believes they represent the majority of the market. Staff did not include companies or individuals that order home playground equipment or components from the listed manufacturers.

CPSC staff developed an evaluation manual for CPSC field investigators to use during visits to the home playground manufacturers. The evaluation manual did not address all requirements of the voluntary standard (ASTM F1148-98c). Rather, staff concentrated on the requirements that address serious hazards such as head entrapment, strangulation, falls and lacerations. The field investigators were instructed on how to measure and photograph the playground equipment.

The evaluation manual contained criteria which the investigators used to assess the equipment (see Appendix A for details). The investigators used templates and gauges to test for hazardous openings and protrusions and entrapment angles as specified in the standard. The investigators also obtained copies of consumer information which the voluntary standard requires, such as installation instructions and a playground surfacing guide.

From October 1999 through April 2000, the field investigators visited manufacturers to obtain sales and testing information and to collect the data. The display units at the manufacturers' sites (or nearby retailers) were the pieces of equipment evaluated for the monitoring program. Staff chose the piece of equipment on display with the most play activities, if more than one unit was on display, and measurements were taken according to the evaluation manual. Despite choosing the units with the greatest number of play activities, none of the manufacturers had a unit that had all the items in the evaluation manual.

CPSC staff reviewed the completed assessments to determine whether the equipment was in conformance with the selected voluntary standard criteria.

III. RESULTS

The investigators visited all 32 home playground equipment manufacturers. Four manufacturers did not provide sales information; two of these produced molded plastic home playground equipment and two produced metal or wood home playground equipment. The molded plastic equipment is different in both design and intended users; therefore, this information is presented separately from the information on the two wood or metal playground manufacturers that did not provide sales information. For the remaining 28 manufacturers that provided sales information, the annual sales figures were used to distinguish between the major manufacturers that control the market and those smaller manufacturers that comprise a small fraction of the home playground market.

For each grouping of manufacturers, the results are presented in six different tables, corresponding to the sections of the evaluation manual and an overall conformance rating. The first five results tables are organized according to the hazard presented by non-conformance to the voluntary standard. These hazards can be seen as the heading in each results table. The shaded blocks represent an evaluation item that was not applicable to the particular piece of playground equipment. The sixth table is the overall conformance rating. This rating is based on the number of conforming evaluation items on the particular piece of equipment in relation to the total number of applicable evaluation items for that piece of equipment. This rating is only the conformance to those items that were evaluated during the study, not conformance to the voluntary standard in its entirety.

A. Manufacturers with Known Sales Figures

Major Home Playground Equipment Manufacturers (over 10,000 units sold/year)

The manufacturers in Tables A1 through A6 are the five major manufacturers of home playground equipment in the United States. The yearly sales for each of the manufacturers (as reported by the individual manufacturers) exceeds 10,000 units. According to the manufacturers' sales figures, they sell a combined total of approximately 1,024,000 units of metal and wood home playground equipment each year. Due to lack of sales information on the specific models measured in the monitoring program, staff is unable to estimate the proportion of the specific models' sales in relation to the total yearly sales for these five manufacturers.

Each of the manufacturers presented a copy of the ASTM voluntary standard F1148 for home playground equipment.

Table A1.

SPACES AND OPENINGS: HEAD ENTRAPMENT AND STRANGULATION								
	Ladder Spaces		Railing/Barrier Space		Angle Spaces			
	Between rungs	Between rung and platform	Between posts	Between R/B and platform	Upright "V" spaces	Braces on A-frames	Non-rigid openings	Ropes
Manufacturer A	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Manufacturer B	Pass	Pass			Pass			
Manufacturer C	Pass	Pass	Pass	Pass	Pass	Pass	***Fail***	Pass
Manufacturer D	Pass	Pass	Pass	Pass	Pass		Pass	Pass
Manufacturer E	Unk.	Pass		Pass				Pass

Table A2.

FALL HAZARDS: FRACTURES/CONCUSSIONS					
	Platform Railings and Barriers				
	30" to 48" platform railing	>48" to 72" platform barrier	Over 72" platform barrier	Slide railing and barrier	Climbing event grip width
Manufacturer A	Pass	Pass	Pass	Pass	Pass
Manufacturer B				Pass	
Manufacturer C	Pass			Pass	Pass
Manufacturer D		Pass		Pass	Pass
Manufacturer E	Pass	Pass	Pass	Pass	Pass

Table A3.

PROTRUSIONS: LACERATIONS AND IMPALEMENTS			
	Sideways/downwards *nuts and bolts*	Upward *nuts and bolts*	Protrusions on slides
Manufacturer A	Pass		Pass
Manufacturer B	***Fail***	Pass	Pass
Manufacturer C	Pass	Pass	Pass
Manufacturer D	Pass	Pass	Pass
Manufacturer E	Pass	Pass	

Table A4.

IMPACT BY COMPONENTS: HEAD INJURIES			
	Spacing between single swing and adjacent support	Spacing between multiple occupancy swing and adjacent support	Spacing between see-saw/horse ride and support
Manufacturer A	Pass		
Manufacturer B	Pass	Pass	
Manufacturer C	Pass		Pass
Manufacturer D	Pass		
Manufacturer E			

Table A5.

CONSUMER INFORMATION IS PROVIDED: HAZARD PREVENTION			
	Installation instruction	Playground surfacing guide	Manufacturer information
Manufacturer A	Pass	Pass	Pass
Manufacturer B	Pass	Pass	Pass
Manufacturer C	Pass	Pass	***Fail***
Manufacturer D	Pass	Pass	Pass
Manufacturer E	Pass	Pass	Pass

Table A6.

CONFORMANCE RATE FOR SELECTED EVALUATION ITEMS	
Manufacturer A	100%
Manufacturer B	92%
Manufacturer C	89%
Manufacturer D	100%
Manufacturer E	100%

Source: Home Playground Conformance Monitoring Program, CPSC 1999-2000.

Manufacturer A

Manufacturer A sells approximately 72,000 wood home playground equipment units annually. Nineteen evaluation items were applicable to the piece of equipment assessed during the investigation. Manufacturer A was 100% in conformance for the selected evaluation items for this model of home playground equipment.

Manufacturer B

Manufacturer B sells approximately 200,000 units of home playground equipment annually. The model that was the subject of the investigation was the only unit in the monitoring program that had a multiple occupancy swing. The manufacturer had one item of non-conformance to the voluntary standard. The equipment had 6 nuts that extended slightly beyond the gauges. These nuts were located below the top support bar on the brackets holding the multiple occupancy swing. This one failure out of 13 applicable evaluation items yielded a conformance rate of 92% for this model of the Manufacturer B home playground equipment.

Manufacturer C

Manufacturer C, a manufacturer of over 600,000 home playground units annually, did not conform with the voluntary standard on two of the evaluation items. The unit measured in the investigation was a wooden piece of equipment. The first failure was with the top row of the cargo net. This top row was 3/4 of an inch too small and the test head probe would not fit through the space creating an entrapment hazard. The model also did not have the manufacturer's name on it. The two items of non-conformance were out of 18 applicable items; thus Manufacturer C was 89% in conformance for the selected evaluation items from the voluntary standard on this model of equipment.

Manufacturer D

Manufacturer D produces wood home playground equipment, selling approximately 15,000 units per year. The piece of equipment measured in the investigation was in full conformance to the selected evaluation items from the voluntary standard.

Manufacturer E

Manufacturer E sells approximately 130,000 units annually. Of the 13 applicable items measured, all 13 were in full conformance for the selected evaluation items.

To arrive at a conformance rate for the five models of these major manufacturers, staff summed the number of non-conforming areas of measurement as well as the total number of applicable areas of measurement for the five models. Over the five models, there were four items that did not meet the conditions of the voluntary standard and a total of 80 applicable evaluation items. This yielded a conformance rate of 96% for the models investigated from these five major home playground equipment manufacturers.

Smaller Home Playground Equipment Manufacturers (under 10,000 units sold/year)

The manufacturers in Tables A7 through A12 are many of the minor home playground equipment manufacturers in the country. Their sales records presented during the investigation showed that each sold less than 10,000 units annually. The 23 manufacturers sell a combined total of approximately 36,000 home playground equipment units a year.

Of the 23 minor home playground equipment manufacturers, 11 of the manufacturers presented a copy of ASTM voluntary standard F1148 to the field investigator.

Table A7.

SPACES AND OPENINGS: HEAD ENTRAPMENT AND STRANGULATION								
	Ladder Spaces		Railing/Barrier Space		Angle Spaces			
	Between rungs	Between rung and platform	Between posts	Between R/B and platform	Upright "V" spaces	Braces on A-frames	Non-rigid openings	Ropes
Manufacturer F	Pass	Pass		Pass	Pass			
Manufacturer G	*Fail*	*Fail*	Pass	Pass	Pass			
Manufacturer H	Pass	*Fail*	*Fail*	Pass	*Fail*	Pass		Pass
Manufacturer I	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Manufacturer J	*Fail*	*Fail*	Pass	Pass	*Fail*			
Manufacturer K	Pass	Pass	Pass	Pass			Pass	*Fail*
Manufacturer L	*Fail*	*Fail*	Pass	Pass	Pass			
Manufacturer M	Pass	Pass	Pass	Pass	Pass	Pass		
Manufacturer N	Pass	Pass	Pass					*Fail*
Manufacturer O	Pass	*Fail*	*Fail*	Pass			*Fail*	Pass
Manufacturer P	*Fail*	*Fail*	*Fail*	*Fail*				*Fail*
Manufacturer Q	Pass	Pass	Pass	Pass		Pass		
Manufacturer R	Pass	*Fail*	Pass	Pass	Pass		Pass	Pass
Manufacturer S	*Fail*	*Fail*	Pass		*Fail*	*Fail*	Pass	*Fail*
Manufacturer T	*Fail*	Pass	*Fail*	Pass	*Fail*	Pass		
Manufacturer U	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Manufacturer V	Pass		Pass	Pass		Pass		*Fail*
Manufacturer W	Pass	Pass	Pass	Pass			Pass	*Fail*
Manufacturer X	Pass	Pass	Pass	*Fail*				*Fail*
Manufacturer Y	*Fail*	*Fail*	*Fail*		*Fail*	*Fail*	Pass	Pass
Manufacturer Z	Pass	Pass	Pass			Pass	Pass	Pass
Manufacturer AA	*Fail*	*Fail*	Pass	*Fail*	Pass			
Manufacturer BB	Pass	Pass	Pass	Pass		Pass	Pass	Pass

Table A8.

FALL HAZARDS: FRACTURES/CONCUSSIONS					
	Platform Railings and Barriers				
	30" to 48" platform railing	>48" to 72" platform barrier	Over 72" platform barrier	Slide railing and barrier	Climbing event grip width
Manufacturer F		***Fail***		Pass	Pass
Manufacturer G	Pass	Pass		Pass	Pass
Manufacturer H	Pass	Pass	Pass	Pass	Pass
Manufacturer I	Pass	Pass	Pass	Pass	Pass
Manufacturer J		***Fail***		Pass	Pass
Manufacturer K	Pass	***Fail***	Pass	Pass	Pass
Manufacturer L	Pass			Pass	
Manufacturer M	Pass			Pass	Pass
Manufacturer N		Pass		Pass	Pass
Manufacturer O		***Fail***		Pass	Pass
Manufacturer P		Pass	***Fail***	Pass	Pass
Manufacturer Q		***Fail***		Pass	Pass
Manufacturer R		***Fail***		Pass	Pass
Manufacturer S		***Fail***		Pass	Pass
Manufacturer T		***Fail***		Pass	Pass
Manufacturer U	Pass	Pass			
Manufacturer V	Pass			Pass	Pass
Manufacturer W		Pass		Pass	Pass
Manufacturer X	Pass			Pass	Pass
Manufacturer Y	***Fail***			Pass	Pass
Manufacturer Z		Pass	Pass	Pass	Pass
Manufacturer AA		Pass		Pass	Pass
Manufacturer BB		Pass		Pass	Unk.

Table A9.

PROTRUSIONS: LACERATIONS AND IMPALEMENTS			
	Sideways/downwards nuts and bolts	Upward nuts and bolts	Protrusions on slides
Manufacturer F	***Fail***	Pass	Pass
Manufacturer G	***Fail***	Pass	
Manufacturer H	Pass		Pass
Manufacturer I	Pass	Pass	Pass
Manufacturer J	Pass	***Fail***	***Fail***
Manufacturer K	Fail	Pass	Pass
Manufacturer L	Pass	Pass	Pass
Manufacturer M	Pass	***Fail***	Pass
Manufacturer N	Pass	***Fail***	
Manufacturer O	Pass	Pass	Pass
Manufacturer P	Pass	***Fail***	***Fail***
Manufacturer Q	***Fail***	***Fail***	
Manufacturer R	***Fail***		
Manufacturer S	***Fail***		Pass
Manufacturer T	Pass		
Manufacturer U	Pass	Pass	Pass
Manufacturer V	Pass	Pass	Pass
Manufacturer W	Pass	***Fail***	Pass
Manufacturer X	Pass		
Manufacturer Y	***Fail***	Pass	Pass
Manufacturer Z	Pass		Pass
Manufacturer AA	Pass	Pass	Pass
Manufacturer BB	Pass		Unk.

Table A10.

IMPACT BY COMPONENTS: HEAD INJURIES			
	Spacing between single swing and adjacent support	Spacing between multiple occupancy swing and adjacent support	Spacing between see-saw/horse ride and support
Manufacturer F	Pass		
Manufacturer G	Pass		
Manufacturer H	Pass		Pass
Manufacturer I	Pass		Pass
Manufacturer J	Pass		
Manufacturer K	Pass		Pass
Manufacturer L	Pass		
Manufacturer M	Pass		
Manufacturer N	Pass		
Manufacturer O	Pass		Pass
Manufacturer P			
Manufacturer Q	Pass		Pass
Manufacturer R			
Manufacturer S	Pass		
Manufacturer T	Pass		
Manufacturer U	Pass		
Manufacturer V	Pass		Pass
Manufacturer W	Pass		
Manufacturer X	Pass		
Manufacturer Y	Pass		Pass
Manufacturer Z	Pass		
Manufacturer AA	Pass		
Manufacturer BB	Unk.		

Table A11.

CONSUMER INFORMATION IS PROVIDED: HAZARD PREVENTION			
	Installation instruction	Playground surfacing guide	Manufacturer information
Manufacturer F	Pass	Pass	Pass
Manufacturer G	Pass	Pass	***Fail***
Manufacturer H	Pass	***Fail***	Pass
Manufacturer I	Pass	Pass	Pass
Manufacturer J	Pass	***Fail***	Pass
Manufacturer K	Pass	Pass	Pass
Manufacturer L	Pass	***Fail***	***Fail***
Manufacturer M	Pass	Pass	Pass
Manufacturer N	Pass	Pass	Pass
Manufacturer O	Pass	***Fail***	Pass
Manufacturer P	***Fail***	***Fail***	Pass
Manufacturer Q	Pass	Pass	***Fail***
Manufacturer R	Pass	***Fail***	***Fail***
Manufacturer S	Pass	***Fail***	***Fail***
Manufacturer T	Pass	Pass	Pass
Manufacturer U	Pass	Pass	Pass
Manufacturer V	Pass	Pass	Pass
Manufacturer W	***Fail***	***Fail***	***Fail***
Manufacturer X	Pass	Pass	***Fail***
Manufacturer Y	***Fail***	***Fail***	***Fail***
Manufacturer Z	Pass	Pass	Pass
Manufacturer AA	Pass	***Fail***	***Fail***
Manufacturer BB	Pass	Pass	***Fail***

Table A12.

CONFORMANCE RATE FOR SELECTED EVALUATION ITEMS	
Manufacturer F	86%
Manufacturer G	73%
Manufacturer H	79%
Manufacturer I	100%
Manufacturer J	53%
Manufacturer K	84%
Manufacturer L	71%
Manufacturer M	94%
Manufacturer N	85%
Manufacturer O	71%
Manufacturer P	33%
Manufacturer Q	73%
Manufacturer R	64%
Manufacturer S	44%
Manufacturer T	71%
Manufacturer U	100%
Manufacturer V	94%
Manufacturer W	69%
Manufacturer X	77%
Manufacturer Y	47%
Manufacturer Z	100%
Manufacturer AA	67%
Manufacturer BB	92%

Source: Home Playground Conformance Monitoring Program, CPSC 1999-2000

Manufacturer F

Manufacturer F sells approximately 1,000 units of home playground equipment a year. This manufacturer did not present a copy of the ASTM voluntary standard to the field investigator. There were two evaluation items on the model equipment evaluated that did not meet the specifications of the voluntary standard. A platform measuring 61 and 1/4 inches had a 25 and 1/4 inch guardrail as opposed to a 27 inch barrier as required in the voluntary standard. The equipment also had sideways facing bolts that extended 1/4 of an inch beyond the measurement gauges. Fourteen evaluation items applied to components on this piece of playground equipment. Manufacturer F had an overall conformance rate of 86% for the selected evaluation items for this model of their equipment.

Manufacturer G

Manufacturer G sells 300 units of home playground equipment in a year. The manufacturer presented a copy of the ASTM voluntary standard at the time of the investigation. The piece of equipment exhibited non-conformance to the voluntary standard on four evaluation items. The spacing between rungs on the arch climber was 1/4 of an inch too small. Additionally, a space between the bottom rung of a ladder and a sand box was over 3 inches too small. The spacing problems create head entrapment hazards. The equipment also had sideways and downward facing bolts that extended beyond the measurement gauges. The final item of non-conformance was with consumer information. The manufacturer's name and contact information

was not located on the piece of equipment. These four problems yielded a 73% conformance rate for this particular model of home playground equipment.

Manufacturer H

Manufacturer H sells over 3,000 pieces of home playground equipment a year. The manufacturer presented a copy of the ASTM voluntary standard; however, the version was one published in 1993 and did not have the most recent additions to the standard. The model that was measured during the investigation showed four evaluation items that did not conform with the voluntary standard. The space between the top rung of the ladder and the spaces between some railings on a platform barrier both measured 3 and 3/4 inches. This allows the test probe to pass through but not the test head probe creating a head entrapment hazard. Another entrapment hazard was presented with upright "V" angles that measured less than 55°. The final problem was that the manufacturer did not provide a safe playground surfacing guide with the consumer information. Manufacturer H, therefore had a 79% (15 of 19 applicable evaluation items) conformance rate for this particular model of home playground equipment.

Manufacturer I

Manufacturer I sells nearly 5,000 pieces of home playground equipment annually. The company showed the investigator the most recently published copy of ASTM standard F1148, and the model evaluated during the investigation conformed with all applicable evaluation items. The manufacturer's model of home playground equipment was in full conformance for the selected evaluation items of the voluntary standard.

Manufacturer J

Manufacturer J sells under 500 units of home playground equipment annually. Manufacturer J did not have a copy of the home playground ASTM voluntary standard. The particular model used during the investigation had activities and components applying to 15 evaluation items. Seven of these evaluation items failed to conform with the voluntary standard. The ladder spaces, both between rungs and between the top rung and the platform, presented entrapment hazards. The spaces allowed the test torso probe to pass through, but did not allow the test head probe to pass. The piece of equipment also had upright "V" angles that measured 30° as opposed to the required 55° angle stated in the voluntary standard. The wood platform was 70 inches off the ground, thus requiring a 27 inch barrier; however, this equipment had guardrails that were only 26 inches high. The company had a revised barrier, but this barrier had a vertical railings that posed a head entrapment hazard. The equipment had upward facing nuts and bolts that extended over 1/8 of an inch beyond the test gauges. The slide also had protrusions that extended more than 1/8 of an inch above the slide surface. Finally, the manufacturer did not include a safe playground surfacing guide with the consumer information. Manufacturer J yielded a 53% conformance rate to the selected evaluation items for this particular model of home playground equipment.

Manufacturer K

Manufacturer K sells approximately 1,000 units of home playground equipment per year. The piece of equipment reviewed during the investigation was a composite structure consisting of the four different sections of equipment that the company manufactures. The manufacturer presented a copy of the ASTM standard at the time of the investigation. The equipment showed three areas of failure out of 19 applicable evaluation items. The equipment had a 7 foot climbing rope that was neither anchored nor had instructions to anchor both ends of the rope. The 54 inch high platforms had barriers measuring 24 inches as opposed to the voluntary standard's 27 inch height requirement. Lastly, there were sideways and downward facing nuts and bolts on the equipment that extended beyond the measurement gauges. Three failures out of 19 evaluation items produced a conformance rate of 84% for Manufacturer K on the composite structure playground equipment.

Manufacturer L

Manufacturer L sells 200 units of home playground equipment annually. The company presented the ASTM standard. The spacing, both between the ladder rungs and between the top rung and the platform was large enough to allow the test torso template to pass through, but too small for the head template to pass, by approximately 1 inch and 2 inches, respectively. The other two areas of non-conformance to the standard were with the consumer information. Manufacturer L did not provide a safe surfacing guide nor was the manufacturer's name and contact information located on the piece of equipment. Therefore, Manufacturer L had a 71% conformance rate for the selected evaluation items for this model of home playground equipment.

Manufacturer M

Manufacturer M sells approximately 1,200 units of home playground equipment per year. The manufacturer did not present a copy of the ASTM voluntary standard to the investigator. The model of equipment examined had one failure out of 16 applicable evaluation items. On the beam holding the swings, there were upward facing bolts that extended 3/4 of an inch beyond the test gauge. This model of Manufacturer M home playground equipment yielded a 94% conformance rate.

Manufacturer N

Manufacturer N sells approximately 4,000 pieces of home playground equipment per year. Although the manufacturer presented a copy of the ASTM standard, it was a 1993 published version and did not contain the updated requirements. The model of equipment assessed during the investigation revealed two failed evaluation items out of 13 applicable items. The instructions for the model of equipment did not include instructions to secure both ends of the climbing ropes and there were upward facing bolts that extended more than 1/8 inch beyond the test gauges. These bolts were located on the beam holding the swings. This model of Manufacturer N home playground equipment was 85% in conformance for the selected evaluation items.

Manufacturer O

Manufacturer O sells about 150 pieces of home playground equipment annually. The company did not have a copy of the ASTM voluntary standard and had five items of non-conformance on the model piece of equipment that was evaluated. Three entrapment hazards were found: a 5 and 1/4 inch space between the top ladder rung and the platform to which the ladder led, 7 and 1/2 inch spaces between the posts on the platform barrier and the 5 to 7 inch spaces in the cargo net. All these measurements are such that the test torso probe could pass through but not the test head probe. In addition to these entrapment hazards, the platform barrier was too short, posing a fall hazard. Lastly, the manufacturer failed to include a safe playground surfacing guide with the consumer information. The five failures out of 17 applicable evaluation items showed a 71% conformance rate to the selected evaluation items for this model of Manufacturer O home playground equipment.

Manufacturer P

Manufacturer P sells less than 100 pieces of playground equipment per year. The company did not have a copy of the ASTM voluntary standard. Of 15 applicable evaluation items for the particular model of equipment reviewed during the investigation, 10 items failed to conform with the voluntary standard. Both the spaces in between the ladder rungs and the space between the top rung of the ladder and the platform ranged from 5 to 7 inches creating entrapment hazards. The platform barrier spaces were entrapment hazards also, both between posts on the platform and between the platform itself and the bottom of the barrier. There were no directions to secure both ends of the climbing ropes. The platform barrier was 1/4 of an inch under the requirement in the voluntary standard. The upward facing nuts and bolts and the hardware on the slide were protrusion hazards. Neither the installation instructions nor a safe playground surfacing guide was provided for the consumer. These problems yielded a 33% conformance rate for the selected evaluation items for this piece of Manufacturer P home playground equipment.

Manufacturer Q

Manufacturer Q sells approximately 700 units of home playground equipment a year. The manufacturer presented a copy of the ASTM standard. It had four failing items on the piece of equipment looked at during the investigation. The platform, which was 59 inches high, had a barrier measuring almost 24 inches as opposed to the voluntary standard requirement of 27 inches. The swing glider had long bolts that protruded to the side and there were bolts on the top of the beam holding the swings that extended more than 1/8 of an inch beyond the measurement gauge. The manufacturer's name and contact information were not provided on the piece of equipment examined. Out of 15 applicable evaluation items, this model of Manufacturer Q home playground equipment had a 73% conformance rate.

Manufacturer R

Manufacturer R sells approximately 50 pieces of equipment annually. The company did not have a copy of the ASTM voluntary standard. Manufacturer R exhibited five failures out of 14 applicable evaluation items for the particular playground equipment model. The spacing between the top rung of the ladder and the platform posed a head entrapment hazard. The platform on the equipment was 58 and 1/2 inches off the ground, thus requiring a 27 inch barrier; however, the barrier on the equipment was only 20 inches tall. The equipment had sideways and downward facing nuts and bolts that extended beyond the measurement gauges. Manufacturer R also failed to provide a safe playground surfacing guide and to put its name and contact information on its product. These failures yielded a conformance rate of 64% for the selected evaluation items for this model of Manufacturer R.

Manufacturer S

Manufacturer S sells over 8,000 pieces of home playground equipment annually. The company presented the CPSC field investigator with a copy of the ASTM voluntary standard. Of 16 applicable evaluation items, nine did not conform to the voluntary standard. Both the spaces between the ladder rungs and between the top ladder rung and the platform posed an entrapment hazard. The hazard is present in these spaces because the test torso probe can fit through the space, but the test head probe could not. Other entrapment hazards included upright "V" angles that were too small, lack of braces on A-frames to eliminate small angles and climbing ropes that did not have directions to secure them at both ends. The barrier on the 70 inch high platform was 24 inches instead of the 27 inch required height. There were sideways and downward facing nuts and bolts that protruded beyond the measurement gauges. Manufacturer S did not provide a safe playground surfacing guide and did not put its name and contact information on the equipment. This particular model of Manufacturer S home playground equipment had a 44% conformance rate for the selected evaluation items.

Manufacturer T

Manufacturer T sells 750 pieces of home playground equipment a year. The manufacturer did not provide the field investigator with a copy of the ASTM voluntary standard. Manufacturer T had three entrapment hazards on the particular model of equipment evaluated: 6 and 1/2 inch spaces between ladder rungs and 6 inch spaces between posts on the platform barrier, both of which allowed passage of the torso probe but not the head probe, and the upright "V" spaces that were less than the required 55° angle. In addition, the 21 inch barrier on the platform, measuring 60 inches high, failed to meet the voluntary requirements by 6 inches. These four failures out of an applicable 14 evaluation items produced a 71% conformance rate for this model of Manufacturer T.

Manufacturer U

Manufacturer U sells approximately 1,000 pieces of home playground equipment a year. The manufacturer did not have a copy of the ASTM voluntary standard. The model evaluated

had components that applied to 17 evaluation items and all of them complied to the standard's specifications, yielding a 100% conformance rate for those selected items.

Manufacturer V

Manufacturer V sells approximately 250 pieces of home playground equipment a year. The manufacturer did not have a copy of the ASTM voluntary standard. Of 16 applicable evaluation items, the model evaluated exhibited one failure, instructions to secure the climbing rope at both ends to avoid strangulation were not provided. This model of Manufacturer V had a 94% conformance rate for the selected evaluation items of the home playground voluntary standard.

Manufacturer W

Manufacturer W sells close to 500 pieces of home playground equipment per year. The playground equipment manufacturer showed the investigator a copy of the ASTM voluntary standard, but the standard was an older version, missing some of the latest revisions. Manufacturer W had five failing evaluation items out of an applicable 16. The company did not provide instructions to anchor both ends of the climbing ropes. The model piece of equipment had upward facing bolts that extended more than 1/2 inch beyond the surface of the equipment. Installation instructions and a safe playground surfacing guide were not included with the consumer information and the manufacturer name and contact information was not on the product. This model of Manufacturer W home playground equipment had a 69% conformance rate for the selected evaluation items of the voluntary standard.

Manufacturer X

Manufacturer X, selling approximately 350 units of home playground equipment a year, did not provide the field investigator with the ASTM voluntary standard. The equipment had components that applied to 13 of the evaluation items; three items did not meet the specifications of the standard. The space between the last rung on the monkey bars and the platform of the monkey bars was too small to allow passage of the test head probe, but allowed passage of the test torso probe, creating an entrapment hazard and there were no instructions to secure both ends of the climbing rope. Manufacturer X also did not put its name and contact information on the playground equipment. These three failures give this model of Manufacturer X home playground equipment a conformance rate of 77% for the selected evaluation items.

Manufacturer Y

Manufacturer Y sells 800 pieces of home playground equipment in a year. The manufacturer was unaware of the ASTM voluntary standard for home playground equipment. The model that was measured during the investigation revealed 10 failures of an applicable 19 evaluation items. The spacing between the ladder rungs measured almost 7 inches and the distance between the top ladder rung and the platform was just under 4 inches. Both measurements permitted passage of the test torso probe but not the test head probe creating head entrapment hazards. The equipment had upright "V" spaces and there were no braces on the A-

frames, both of which present entrapment hazards. The platform railing failed to meet the height requirement in the standard by 2 and 1/2 inches and there were sideways and downward facing nuts and bolts that were 1/4 to 1/2 an inch too long. There were no installation instructions or a safe playground surfacing guide and Manufacturer Y did not put its name and contact information on the equipment. This particular model of Manufacturer Y home playground equipment had a 47% conformance rate for the selected evaluation items of the voluntary standard.

Manufacturer Z

Manufacturer Z sells approximately 4,000 pieces of home playground equipment annually. The manufacturer did present a copy of the ASTM voluntary standard. Of the 16 applicable evaluation items, the equipment met the standard's specifications on all of them, thus yielding a 100% conformance rate for those selected items.

Manufacturer AA

Manufacturer AA sells 200 units of home playground equipment annually and did not have the ASTM voluntary standard to show the CPSC field investigator. The manufacturer failed to meet the requirements of the voluntary standard in five of the 15 applicable evaluation items. Multiple ladders had incorrect spacing, measuring between 8 and 9 inches, large enough to pass the test torso probe through but too small for the test head probe to pass through. The spaces between the ladder rungs and the platforms were also entrapment hazards, measuring between 4 and 8 inches. The space between the platform and the bottom of the side barriers was also approximately 8 inches creating an entrapment hazard. Manufacturer AA failed to provide information on safe playground surfacing and did not put its name and contact information on the piece of playground equipment. These five failures produced a 67% conformance rate for this particular model of Manufacturer AA home playground equipment.

Manufacturer BB

Manufacturer BB sells approximately 3,000 pieces of home playground equipment yearly. The manufacture provided the field investigator with a copy of the voluntary standard. The one failure with the piece of equipment examined during the evaluation was that the company did not put its name and contact information on the piece of equipment. Three additional evaluation items may have been applicable for this equipment; however, the equipment was not evaluated for these items. These evaluation items are noted as *unknown* in the results tables. Out of 13 applicable, and measured, evaluation items, the one failure produced a 92% conformance rate for this model of Manufacturer BB home playground equipment.

Overall, the smaller home playground equipment manufacturers had an average of 75% conformance rate to the voluntary standard for home playground equipment.

B. Manufacturers with Unknown Sales Figures

Molded Plastic Home Playground Equipment Manufacturers

Manufacturer CC and Manufacturer DD are manufacturers of molded plastic home playground equipment, a type of equipment intended for younger children. These manufacturers did not provide their sales figures. The results for these manufacturers are provided below:

Table B1.

SPACES AND OPENINGS: HEAD ENTRAPMENT AND STRANGULATION								
	Ladder Spaces		Railing/Barrier Space		Angle Spaces			
	Between rungs	Between rung and platform	Between posts	Between R/B and platform	Upright "V" spaces	Braces on A-frames	Non-rigid openings	Ropes
Manufacturer CC	Pass	Pass	Pass	Pass		Pass		
Manufacturer DD	Pass	Pass						

Table B2.

FALL HAZARDS: FRACTURES/CONCUSSIONS					
	Platform Railings and Barriers				
	30" to 48" platform railing	>48" to 72" platform barrier	Over 72" platform barrier	Slide railing and barrier	Climbing event grip width
Manufacturer CC	Pass	Pass			
Manufacturer DD	***Fail***			Pass	Pass

Table B3.

PROTRUSIONS: LACERATIONS AND IMPALEMENTS			
	Sideways/downwards nuts and bolts	Upward nuts and bolts	Protrusions on Slides
Manufacturer CC	Pass	Pass	Pass
Manufacturer DD	Pass	Pass	Pass

Table B4.

IMPACT BY COMPONENTS: HEAD INJURIES			
	Spacing between single swing and adjacent support	Spacing between multiple occupancy swing and adjacent support	Spacing between see-saw/horse ride and support
Manufacturer CC	[redacted]	[redacted]	[redacted]
Manufacturer DD	Pass	[redacted]	[redacted]

Table B5.

CONSUMER INFORMATION IS PROVIDED: HAZARD PREVENTION			
	Installation instruction	Playground surfacing guide	Manufacturer information
Manufacturer CC	Pass	Pass	Pass
Manufacturer DD	Pass	Pass	Pass

Table B6.

CONFORMANCE RATE TO SELECTED EVALUATION ITEMS	
Manufacturer CC	100%
Manufacturer DD	96%

Source: Home Playground Conformance Monitoring Program, CPSC 1999-2000.

Manufacturer CC

Upon investigation of a model of Manufacturer CC home playground equipment, there were no violations of the voluntary standard found, out of 13 applicable evaluation items. Thus this model of Manufacturer CC home playground equipment was in full conformance for the selected evaluation items of the voluntary standard.

Manufacturer DD

The investigated piece of Manufacturer DD equipment met the voluntary standard specifications for 11 of the 12 applicable evaluation items. The one failing item was the railing on a platform, which was not the proper height. This one failure resulted in a conformance rate of 92% for this model of Manufacturer DD home playground equipment.

Both manufacturers of molded plastic home playground equipment presented copies of the ASTM standard during the evaluations. The combined conformance rate for these two manufacturers of molded plastic home playground equipment was 96%.

Wooden or Metal Playground Manufacturers

Manufacturer EE and Manufacturer FF did not give their sales information. Therefore, a conclusion cannot be made as to whether these companies are major or minor home playground manufacturers.

Manufacturer EE and Manufacturer FF both presented a copy of the ASTM voluntary standard during the investigation.

Table B7.

SPACES AND OPENINGS: HEAD ENTRAPMENT AND STRANGULATION								
	Ladder Spaces		Railing/Barrier Space		Angle Spaces			
	Between rungs	Between rung and platform	Between posts	Between R/B and platform	Upright "V" spaces	Braces on A-frames	Non-rigid openings	Ropes
Manufacturer EE	Pass	Pass	Pass	Pass				
Manufacturer FF	Pass	Pass	Pass					

Table B8.

FALL HAZARDS: FRACTURES/CONCUSSIONS					
	Platform Railings and Barriers				
	30" to 48" platform railing	>48" to 72" platform barrier	Over 72" platform barrier	Slide railing and barrier	Climbing event grip width
Manufacturer EE	Unk.	Unk.	Unk.	Pass	Pass
Manufacturer FF		Pass		Pass	

Table B9.

PROTRUSIONS: LACERATIONS AND IMPALEMENTS			
	Sideways/downwards nuts and bolts	Upward nuts and bolts	Protrusions on Slides
Manufacturer EE	Pass	Pass	Pass
Manufacturer FF	Pass	Pass	Pass

Table B10.

IMPACT BY COMPONENTS: HEAD INJURIES			
	Spacing between single swing and adjacent support	Spacing between multiple occupancy swing and adjacent support	Spacing between see-saw/horse ride and support
Manufacturer EE			
Manufacturer FF	Pass		

Table B11.

CONSUMER INFORMATION IS PROVIDED: HAZARD PREVENTION			
	Installation Instruction	Playground surfacing guide	Manufacturer information
Manufacturer EE	Pass	Pass	***Fail***
Manufacturer FF	Pass	Pass	Pass

Table B12.

CONFORMANCE RATE FOR SELECTED EVALUATION ITEMS	
Manufacturer EE	92%
Manufacturer FF	100%

Source: Home Playground Conformance Monitoring Program, CPSC 1999-2000

Manufacturer EE

Manufacturer EE had one failure on the evaluated model of home playground equipment. The manufacturer's name and contact information was not provided on the piece of equipment.

Three additional evaluation items may have been applicable for this equipment; however, the equipment was not assessed for these items. These evaluation items are noted as *unknown* in the results tables. Out of 12 applicable and measured evaluation items, the one failure yields a 92% conformance rate.

Manufacturer FF

The investigated piece of equipment for Manufacturer FF complied with the standard's specification on all of the 12 applicable evaluation items. The model of Manufacturer FF home playground equipment was in full conformance for the selected evaluation items of the standard.

IV. CONCLUSIONS

Sales Figures

From the information provided during the monitoring program, staff estimates that these 32 manufacturers sell at least 1,060,000 home playground units a year. This is an estimate based on the 28 manufacturers that provided sales information. It is a minimum figure since sales information was not obtained for four of the manufacturers. The sales total for the five major manufacturers listed in section B is 1,024,000, almost 97% of the total sales figure. The remaining 3% of the home playground equipment produced by manufacturers in the monitoring program were from smaller manufacturers. Over 99% of the home playground sets sold were made by manufacturers that presented the ASTM standard during the monitoring program.

Conformance Rates

All conformance rates discussed below are calculated for the particular model investigated in the monitoring program. The rates are based on how many activities and components of the equipment met the specifications of the voluntary standard for the selected evaluation items. Not all playground equipment had activities and components that were listed in the evaluation manual. The conformance rates were based only on those evaluation items that were applicable and evaluated during the investigations.

For the 28 manufacturers for which sales information was available, the chosen models from the major manufacturers had an overall conformance rate of 96% to the selected evaluation items. This compares to the overall conformance rate of 75% to the selected evaluation items for the model equipment of the smaller manufacturers. These conformance rates are the average of each manufacturer's conformance to the voluntary standard within the two groups of major and minor home playground equipment manufacturers.

Another valuable comparison is that of manufacturers who presented copies of the ASTM voluntary standard F1148 to those manufacturers that did not have a copy of the standard. Of the 32 manufacturers, 20 of them provided copies of the standard, either old or new versions. The conformance rate for those 20 manufacturers averaged 87%. The remaining 12 manufacturers that did not have the ASTM standard had an average conformance rate of 71%. Thus, those

manufacturers who appeared knowledgeable about the voluntary standard (i.e. they had a copy of the standard) had a higher conformance rate than those who did not have a copy of the standard.

Individual Evaluation Item Conformance

Table IV on the following page describes the conformance for the individual evaluation items. The table further breaks down the conformance rates for all manufacturers and those that presented the ASTM voluntary standard.

The right hand column of the table gives an overview of the percentage of manufacturers that conformed with each of the listed evaluation items. For instance, for Spaces Between Ladder Rungs, 74% of the manufacturers that had spaces in between the rungs of the ladders on the inspected equipment had the correct spacing, thus preventing a head entrapment hazard. All but six evaluation items had at least one manufacturer fail to conform to the ASTM voluntary standard. The six areas with full conformance were the multiple occupancy swing spacing, slide railings and barriers, climbing event grip width, spacing between the single swing and the adjacent support, spacing between the multiple occupancy swing and adjacent support and spacing between the see-saw swing and horse ride and their adjacent supports. The areas with the least conformance were the manufacturer name and contact information being located on the piece of home playground equipment and instructions to anchor climbing ropes.

The middle column of the table shows the percentage of conformance for the manufacturers that presented ASTM standards. For instance, 84% of the manufacturers that had ASTM standards met the specifications for the spaces between the ladder rungs. The number of evaluation items with full conformance increases from six to nine for the manufacturers with ASTM standards. In addition to the six evaluation items previously mentioned with full manufacturer conformance, the manufacturers with ASTM standards fully complied with the specifications for the spaces between the platforms and barriers, the height of the platform barriers for barriers over 72" and protrusions on slides. The area of least conformance among the manufacturers that showed ASTM standards was, again, that the manufacturer name and contact information were not on the piece of equipment.

Table IV.

	Manufacturers Presenting ASTM Standard			All Manufacturers		
Evaluation item	# of Manufacturers Complied with Standard	Total # Manufacturers with Applicable Equipment	%	# of Manufacturers Complied with Standard	Total # of Manufacturers with Applicable Equipment	%
Spaces between ladder rungs	16	19	84	23	31	74
Spaces between top ladder rung and platform	15	20	75	21	31	68
Spaces between posts on platform barrier	16	17	94	22	28	79
Spaces between platform and Barrier	14	14	100	22	25	88
Upright "V" Spaces	7	9	78	12	17	71
Braces on A-frames	8	9	89	12	14	86
Non-Rigid Openings	8	9	89	11	13	85
Lawn Swing Spacing	1	1	100	1	1	100
Anchoring Ropes	8	12	67	12	19	63
Platform Railings and Barriers (height between 30" and 48")	9	10	90	13	15	87
Platform Railings and Barriers (height between 48" and 72")	12	15	80	15	23	65
Platform Railings and Barriers (height above 72")	6	6	100	6	7	86
Slide Railings and Barriers	19	19	100	30	30	100
Climbing Event Grip Width	15	15	100	26	26	100
Sideways/Downward Facing Nuts and Bolts	15	20	75	24	32	75
Upward Facing Nuts and Bolts	12	15	80	18	24	75
Protrusions on Slides	15	15	100	22	24	92
Spacing Between Single Swing and Adjacent Support	16	16	100	26	26	100
Spacing Between Multiple Occupancy Swing & Support	1	1	100	1	1	100
Spacing Between See-Saw Swing/Horse Ride & Support	4	4	100	7	7	100
Installation Instructions	19	20	95	29	32	91
Safe Playground Surfacing Guide	16	20	80	22	32	69
Manufacturer Name and Contact Information	12	20	60	20	32	63

Source: Home Playground Conformance Monitoring Program, CPSC 1999-2000

APPENDIX A

Evaluation manual Key

This document lists the areas of the playground equipment that the investigators examined and measured for conformance to ASTM voluntary standard F1148-98c. The specifications listed below are what the standard requires. If the specification below is not met on the equipment measured, the piece of equipment fails the voluntary standard for that evaluation item. If there are multiple spaces to measure, or protrusions to measure, all spaces and protrusions must meet the specification of the standard in order to pass; if any of the spaces or protrusions do not meet the standard, the piece of equipment fails the voluntary standard for that evaluation item.

SPACES AND OPENINGS: HEAD ENTRAPMENT AND STRANGULATION

1. Ladder Spaces
   a. Spaces between rungs - both the head template and the torso template must pass through these spaces or neither of the templates should pass through these spaces.
   b. Space between the top rung and the platform - both the head template and the torso template must pass through this space or neither of the templates should pass through this space.
2. Platform Railings and Barrier Spaces
   a. Spaces between the railings and posts - both the head template and the torso template must pass through these spaces or neither of the templates should pass through these spaces.
   b. Spaces between the platform and the railing or barrier - both the head template and the torso template must pass through these spaces or neither of the templates should pass through these spaces.
3. Angle Spaces
   a. Upright "V" spaces - this angle must be greater than 55°. The angle on the equipment should be larger than the angle template.
   b. Braces on A-frame - if the angle is less than 55°, it should be filled so that the head template does not fit in the angle or touch the support bars.
4. Non-Rigid Openings (e.g. cargo net) - both the head template and the torso template must pass through these spaces or neither of the templates should pass through these spaces.
5. Lawn Swing Spaces[1]
   a. Space between the seat and backrest - space shall not be over 3 inches.
   b. Space between the seat and footrest - space shall not be over 10 inches.
   c. Space between the seat and armrest - both the head template and the torso template must pass through these spaces or neither of the templates should pass through these spaces.
   d. Foot slats - spaces between the foot slats must be less the 1.5 inches.
6. Ropes - suspended climbing ropes, chains or cables must be secured at both ends.[2]

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[1] The results of the lawn swing spacing measurements are not included in the results tables because only one manufacturer in the monitoring program had a lawn swing on the model equipment. The results for this manufacturer are noted in the narrative.

[2] Since many of the display units were on surfaces that did not allow anchorage, the installation instructions were reviewed for instruction to anchor both ends of the ropes. If there were not instructions available, the decision was based on whether the ropes on the display unit were anchored at both ends.

FALL HAZARDS: FRACTURES/CONCUSSIONS

7. Platform Railings and Barriers
   a. For platforms between 30 inches and 48 inches - must have a railing at least 25 inches high.
   b. For platforms between 48 inches and 72 inches - must have a barrier at least 27 inches high.
   c. For platforms over 72 inches - must have a barrier at least 33 inches high.
8. Slide Railings and Barriers - must have railings or barriers on all sides of the transition area at the top of the slide, except for the entrance and the exit.
9. Ladder Rungs and Climbing Events Grip Width - must not be greater than 1.6 inches in diameter.

PROTRUSIONS: LACERATIONS AND IMPALEMENTS

10. Bolts and Nuts (facing sideways or down) - none of the bolts should extend beyond the bolt gauges.
11. Bolts and Nuts (facing upwards) - no bolts that fit into the gauges should extend beyond 1/8 inch above any surface.
12. Protrusions on Slides - shall be no protrusions more than 1/8 inch accessible to a child using the slide. A rounded surface protruding slightly beyond 1/8 inch is exempt.

IMPACT BY COMPONENTS: HEAD INJURIES

13. Spacing Between Single Swing and Adjacent Support - must be at least 7 inches from the support at 28 inches above the seat.
14. Spacing Between Multiple Occupancy Swing and Adjacent Support - must be at least 7 inches from the support at 28 inches above the seat.
15. Spacing Between See-Saw Swings and Horse Rides and Adjacent Support - must be at least 16 inches from the center of the seat to the support at 22 inches above the seat.

CONSUMER INFORMATION: HAZARD PREVENTION

16. Installation Instructions - should provide instructions for installation if necessary
17. Anchoring Instructions - should provide instructions to anchor equipment to ground if necessary.[3]
18. Playground Surfacing Guide - should have CPSC guideline for safe playground surfacing materials and depths.
19. Manufacturer, Name, City, State, Zip on Unit - should have manufacturer information and contacts fixed on the equipment.

[3] This evaluation item was eliminated from the analysis. The voluntary standard requires anchoring instructions only if necessary for that particular unit. Not all home playground equipment needs anchoring since the stability is built into the design of the equipment.