CPSC/OFC OF THE SECRETARY
FREEDOM OF INFORMATION
98 APR 29 P 2:43

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

BALLOT VOTE SHEET

DATE: APR 27 1998

TO : The Commission
Sadye E. Dunn, Secretary

FROM : Jeffrey Bromme, General Counsel
Steve Lemberg, Assistant General Counsel
Patricia M. Pollitzer, Attorney, OGC

SUBJECT: Proposed Technical Changes to Sleepwear Standard and Clarification of Enforcement Policy

Ballot Vote Due: MAY 7 1998

Attached is a briefing package recommending that the Commission propose three technical changes to the flammability standards for children's sleepwear that would clarify where garment measurements should be taken to determine if they meet the exemption for tight-fitting garments. A draft Federal Register notice proposing these changes is at Tab H. The staff also recommends that the Commission propose a change to the enforcement policy published with the sleepwear standards. This change would clarify that tight-fitting and infant garments may be marketed with traditional flame resistant sleepwear. A draft Federal Register notice proposing this change is at Tab I.

Please indicate your vote:

A. Technical Changes

1. Approve the Federal Register notice proposing three technical changes to the flammability standards for children% sleepwear as drafted.

Signature _____ Date _____

NOTE: This document has not been reviewed or accepted by the Commission.
Initial _____ Date 4/27/98

CPSA 6 (b)(1) Cleared
4/27/98
No Mfrs/PrvtLblrs or Products Identified

2. Approve the draft Federal Register notice proposing three technical changes to the flammability standards for children's sleepwear with the following changes (please specify) : _____

_____

_____

_____ Signature _____ Date

3. Do not approve the draft Federal Resister notice proposing three technical changes to the flammability standards for children's sleepwear.

_____ Signature _____ Date

B. Clarification of Enforcement Policy

1. Approve the Federal Register notice proposing to clarify the sleepwear enforcement policy as drafted.

_____ Signature _____ Date

2. Approve the draft Federal Resister notice proposing to clarify the sleepwear enforcement policy with the following changes (please specify): _____

_____

_____

_____ Signature _____ Date

3. Do not approve the draft Federal Register notice proposing to clarify the sleepwear enforcement policy.

_____ Signature _____ Date

c. Take other action (please specify): _____

_____

_____

_____ _____
Signature Date

Attachment

BRIEFING PACKAGE

CHILDREN'S SLEEPWEAR FLAMMABILITY STANDARDS

Technical and Enforcement Policy Amendments

For Further Information Contact:

Margaret Neily
Project Manager
Directorate for Engineering Sciences
(301) 504-0550, ext. 2354

NOTE: This document has not been reviewed or accepted by the Commission.
Initial rch Date 4/27/98

CPSA 6 (b)(1) Cleared
4/27/98
No Mfrs/PrvtLblrs or Products Identified

Table of Contents

Page

EXECUTIVE SUMMARY.....5

BRIEFING MEMORANDUM.....6

I. INTRODUCTION 6

II. BACKGROUND 7

III DEATH/INJURY UPDATE 8

IV. ECONOMIC UPDATE 9

V. SEGREGATION OF COMPLYING AND EXEMPT SLEEPWEAR.....10

VI. MANUFACTURER/RETAILER PROBLEMS 10
- A. Industry Proposals.....11
- B. Staff Evaluation/Structured Observations.....12

VII DISCUSSION.....14
- A. Garment Feasibility and Practicality.....14
- B. Suggested Amendments to the Standards.....18

VIII. INFORMATION & EDUCATION CAMPAIGN.....22

IX. CONCLUSIONS.....22

X. OPTIONS.....24

XI RECOMMENDATION.....24

TABS

Tab A Report from C. Craig Morris, Ph.D., EHHA, "Clothing-Related Thermal Burns in Children Under 15 Years Old," March 1998.....26

Tab B Memorandum from Terrance R. Karels, EC, to Margaret L. Neily, Project Manager, "Children's Sleepwear Update," April 9, 1998.....40

Tab F Log of February 18, 1998, meeting (without attachments), Margaret Neily, ESME, "Children's Sleepwear--snug-fitting requirements," March 4, 1998 105

Tab G Memorandum from Linda Fansler, Division of Engineering, LS, to Margaret L. Neily, Project Manager, "Tolerance," April 8, 1998 109

Tab H Draft Federal Register-Notice, 16 CFR Parts 1615 and 1616, Proposed Technical Changes, Standard for the Flammability of Children's Sleepwear: Sizes 0 Through 6X; and Standard for the Flammability of Children's Sleepwear: Sizes 7 Through 14 115

Tab I Draft *Federal Register* Notice, 16 CFR Parts 1615 and 1616, Proposed Clarification of Statement of Policy; Standard for the Flammability of Children's Sleepwear: Sizes 0 through 6X; Standard for the Flammability of Children's Sleepwear: Sizes 7 through 14 139

Executive Summary

In September 1996, the Commission amended the Children's Sleepwear Flammability Standards (16 CFR 1615 and 1616) to exempt certain snug-fitting sleepwear garments (referred to as tight-fitting in the standards) from flame resistance requirements. In November 1997, the Commission extended its stay of enforcement against garments used as sleepwear but marketed as "underwear" to June 1998. After June 9, 1998, all non flame-resistant sleepwear must meet the current snug-fitting requirements or the proposed technical amendments recommended in this briefing package.

The American Apparel Manufacturers Association and individual manufacturers and retailers have reported many problems with producing and marketing the snug-fitting sleepwear garments since the 1996 amendments. The Commission staff reviewed these problems as well as solutions proposed by the industry. The staff evaluated possible revisions to the measurement locations, particularly the upper arm, seat and thigh to determine the usefulness of these changes and the practicality of garments that could be produced. The staff evaluated garments made to the current specifications and to the possible revisions using structured observations (fittings) with child models.

The staff concluded that strict adherence to the measurement points currently described in the standards produces impractical, unwearable garments. However, comfortable, practical, snug-fitting sleepwear can be produced with slight changes in the standards. Several clarifying amendments are needed for garment measurements of the upper arm, seat, and thigh to be accurate (correspond to the appropriate part of the body) and to insure proper fit.

While there is no formal coordinatiori of consumer information efforts at this time, manufacturers and retailers who are marketing snug-fitting garments are using garment labels and store signs with consistent messages about the need for a snug fit for safety.

The staff recommends that the Commission issue these minor changes to the garment measurement locations in the sleepwear standards in a Notice of Proposed Rulemaking for public comment. Also, the staff recommends a change in the enforcement policy to clarify the acceptability of marketing and promoting snug-fitting sleepwear alongside traditiona,1 flame resistant sleepwear.

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

MEMORANDUM

DATE: APR 27 1998

TO : The Commission
Sadye E. Dunn, Secretary

Through: Jeffrey S. Bromme, General Counsel
Pamela Gilbert, Executive Director

FROM : Ronald L. Medford, Assistant Executive Director, RLM
Office of Hazard Identification and Reduction
Margaret L. Neily, Project Manager, MN
Directorate for Engineering Sciences
(301) 504-0550 ext. 2354

SUBJECT: Children's Sleepwear Flammability Standards--Technical and Enforcement Policy Amendments

I. INTRODUCTION

This briefing package reviews events since the Commission issued amendments to the Flammability Standards for Children's Sleepwear in September 1996. The staff makes recommendations for several technical amendments to clarify garment measurement points that determine compliance with the snug-fitting requirements. The Compliance staff also recommends a clarification of the enforcement policy to allow sale and promotion of snug-fitting sleepwear with other complying sleepwear (traditional flame resistant garments).

NOTE: This document has not been reviewed or accepted by the Commission.
Initial Date 4/27/98

CPSA 6 (b)(1) Cleared
No Mfrs/PrvtLbls or Products Identified

II. BACKGROUND

On September 9, 1996, the Commission issued an amendment to the Children's Sleepwear Flammability Standards (16 CFR 1615 and 1616) that provided an exemption from flame resistance requirements for certain sleepwear garments. The Commission determined that snug-fitting garments (referred to as tight-fitting in the standards) could provide a level of safety comparable to complying flame resistant sleepwear. Compared to loose-fitting garments, snug-fitting garments generally *reduce* the likelihood of ignition and progression of burning if ignition does occur. In this package, the term "snug-fitting" replaces "tight-fitting." Although the term remains in the standards, tight-fitting has a negative image--tight, restrictive, uncomfortable-- which is inconsistent with the garment intended by the standards. A snug-fitting garment that touches the body, if designed well and made of appropriate fabric, will be none of these. The term snug-fitting is being used consistently in consumer information and labeling related to the standards.

The regulations now allow the sale of non-complying sleepwear garments if they meet specific dimensional restrictions [Sections 1615.1(o) and 1616.1(m), respectively]. The requirements specify maximum allowable garment dimensions for chest, waist, seat, upper arm, wrist, thigh, and ankle, equaling standard body measurements for sleepwear in sizes above 9 months.

The Commission has allowed non-flame resistant sleepwear to be marketed as underwear under a stay of enforcement since 1993. These garments have to be "skin-tight or nearly skin-tight, similar in design, material, and fit to underwear, and labeled as 'underwear."' When the stay expires on June 9, 1998 (extended from March 9, 1998, by Commission vote in October 1997) non-flame resistant sleepwear garments will have to meet the snug-fitting requirements* to be exempt from the standards.

During the development of the amendments for snug-fitting sleepwear, the Commission recognized that a number of limitations

*** As defined in the amended standards of 1996, the Compliance** enforcement **letter of December 9, 1996, and, if the Commission chooses to issue them, the changes recommended in this briefing package.**

would be inherent in the requirements. To allow for comfort and movement, complying garments would have to be made of fabrics that could stretch adequately--specifically, knits. Many traditional knit fabrics and some design features, such as hemmed cuffs and overstitching, might not be usable because they lack adequate stretch. Shrinkage would have to be controlled before sale so that fit would be snug from the start (but not change unacceptably after use) and so compliance could be determined readily by manufacturers, their customers (retailers) and the Commission's enforcement staff. Manufacturing tolerances (allowable dimensional variations) larger than the specified dimensions were not included in the standards for the same reasons shrinkage allowances were not included. Jump-sizing (e.g. garments marketed in small, medium, and large rather than single numerical sizes) might not be feasible because each size would have to meet the dimensions of the smallest numerical size included in the range. Nevertheless, one need only look at actionwear (for biking, dancing, aerobics) and leggings to see that such popular, comfortable snug-fitting garments are indeed feasible and technologically practicable.

Consumer acceptance of snug-fitting sleepwear is another matter. Even today, after limited marketing of snug-fitting sleepwear, the level of acceptance is uncertain. A retail sizing expert at the Commission's June 24, 1997, Systems Anthropometry workshop stressed that our societal definitions of good fit depend on the type of garment. For instance, consumers expect a T-shirt to fit differently than a suit'coat. Clearly, snug-fitting sleepwear would not meet the usual consumer expectations of a comfortable pair of pajamas. When the Commission voted to issue the snug-fitting sleepwear regulation, the American Apparel Manufacturers Association (AAMA) volunteered to conduct a consumer education campaign to inform consumers of the safety provided by this "new" style of sleepwear. AAMA has not yet implemented the campaign. This critical consumer information was believed to be essential to the successful marketing and safe use of snug-fitting garments.

III. DEATH/INJURY UPDATE

A review of clothing-related thermal death and injury data for children under 15 years old is attached at **Tab** A. After a

sharp decline in clothing-related thermal burn fatalities during the 1970's, deaths of children between 0 and 14 years old have stabilized at 6 or fewer per year since 1980. Similarly, NEISS data on reported hospital emergency room-treated injuries among children under 15 years old revealed no specific trend in the annual clothing-related thermal burn injuries from 1980 to 1997.

CPSC staff reviewed the in-depth investigations of clothing-related thermal burn injuries from 1993 to 1997 (since the stay of enforcement was issued). Thirty-two cases involved children wearing sleepwear or garments used as sleepwear: 23 cases involved oversize or loose-fitting T-shirts, 5 cases involved traditional flame resistant sleepwear, and 4 involved unusual garments. The four unusual garments (and associated injuries) included loose-fitting cotton pajamas (20% body burns that required skin grafts), an adult gown (first and second degree burns), an adult nightshirt (10 day hospitalization), and a tight-fitting T-shirt too small for the child (minor burns). The loose-fitting pajamas appeared to be non-conforming sleepwear; the persistent burning of the garment (as described by the mother) is inconsistent with the flame resistant property of complying sleepwear. While snug-fitting garments were not expected to entirely eliminate burn incidents, the tight-fitting T-shirt incident is an example of the reduced burn injury severity anticipated should an ignition occur.

The in-depth investigations revealed that none of the 32 thermal-burn incidents involved "stay of enforcement" garments or garments exempt from current sleepwear flammability standards (certain tight-fitting garments and garments sized for infants 9 months old and under). None of the traditional flame resistant garments required hospitalization. The most frequent and severe sleepwear-related thermal burn injuries involved oversize, loose-fitting T-shirts.

IV. ECONOMIC UPDATE

The Directorate for Economics prepared a market update for the period of 1993 through 1996, covering children's wear, especially garments subject to the stay of enforcement, traditional flame resistant sleepwear and new snug-fitting sleepwear. (See Tab B.) During this period, there was an 8 percent increase in the U.S. population of children (through age

14). Unit sales of traditional flame resistant sleepwear increased 28 percent; underwear sales increased 22 percent (attributed by *Earnshaw's* magazine to underwear used as sleepwear); and children's playwear sales increased 8 percent.

Although the industry as a whole reported increased sales, sales of flame resistant polyester sleepwear have remained steady among the firms interviewed. Marketers interviewed have all stopped producing cotton garments subject to the stay which ends June 9, 1998. Their experiences with producing non-flame resistant snug-fitting sleepwear vary. Citing various fabric, design and manufacturing difficulties, some manufacturers have . withdrawn from marketing the snug-fitting sleepwear. Others have overcome these problems and report successful marketing of their products.

V. SEGREGATION OF COMPLYING AND EXEMPT SLEEPWEAR

After the snug-fitting amendments were issued, CPSC compliance staff received calls from firms asking if they could market the snug-fitting sleepwear on the same rack with flame resistant children's sleepwear. Since the definition of children's sleepwear now excludes infant garments and/or "tight-fitting" garments, industry was concerned about the enforcement policy statements in 16 CFR 1615.64 and 1616.65 which suggest they segregate items covered by the standards from all garments that are beyond the scope of the standards.

At Tab C, the Compliance staff recommends that the policy statements of both standards be clarified to provide that infant garments (sized nine months and under) and "tight-fitting" garments can be marketed and promotedwith other sleepwear. Proposed text revisions are included in the draft *Federal Register* notice at Tab I to clarify the enforcement policy.

VI. MANUFACTURER/RETAILER PROBLEMS

When it came time for manufacturers to design snug-fitting sleepwear to be sold as early as 1997, they began to identify new problems with design and construction and with potential rejection by their retail customers. If manufacturers/retailers want to continue marketing non-flame resistant (such as cotton) garments for sleepwear, they have to meet the snug-fitting

requirements when the stay of enforcement against sleepwear sold as underwear expires in June 1998 (originally March 1998).

A. Industry Proposals

In late **1996,** the major controversy centered on the location of the measurement and the dimension of the upper arm. Commission staff sent an enforcement letter (December 9, 1996) to the industry clarifying the measurement of the upper arm because constructing a garment as described in the final standard would generally require the armhole to be significantly smaller and, therefore, uncomfortable under the arm. This enforcement letter was sent to about 1,300 childrenswear manufacturers and others and was posted on the CPSC web site.

Although individual manufacturers came to the staff with their problems, the major spokesman for the industry remained the AAMA. On March 6, 1997, AAMA presented CPSC staff with a comprehensive list of manufacturing problems its members had encountered in attempting to make snug-fitting sleepwear. They stated that nearly all garment dimensions are too small. They are having design problems with the seat/thigh ratio, head openings, and sleeves. Garment production cycles are being disrupted, and retailers are rejecting the garments. They offered to form a task force to develop workable garment specifications that would solve these problems.

On June 4, 1997, the Industry Task Force presented recommendations for producing cotton garments that they believed would meet consumers' comfort, quality, and safety expectations. They proposed a new set of garment dimensions allowing for fabric characteristics (stretch, recovery, and shrinkage), revised points of measure, and suggested methods of enforcement. Most of their recommended measurements were larger than the dimensions in the standards. The end result was intended to be garments that meet the current body dimensions of the Standards **after three launderings.** The staff observes that these specifications would not work equally well with all fabrics. Garments made from fabrics with good shrinkage control would not become snug-fitting as required.

The Task Force recommendations were followed on June 9, 1997, by another set of more clearly focused proposals from the

AAMA which were discussed in a public meeting on June 25, 1997. Their five recommendations involved increasing the allowed dimensions for wrist, ankle, and sweep (bottom edge of garment top) along with moving measurement points and enlarging the dimensions for the upper arm and thigh. Their most serious problem remained the dimension of the upper arm. Without significant changes in this area, AAMA and others believe they cannot successfully market the snug-fitting garments. As with the Task Force recommendations, increasing the garment dimensions beyond snug-fitting would reduce the safety of the garments.

More recently at a February 18, 1998, meeting with CPSC staff, manufacturers and retailers of snug-fitting sleepwear again requested the addition of production or sewing tolerances. This issue was previously considered by the CPSC staff and rejected during the development of the snug-fitting amendments. The staff agreed to review the need for positive tolerances (dimension variations that are larger than the specifications) again and provides comments later in the briefing paper.

B. Staff Evaluation/Structured Observations

The Commission staff reviewed the various concerns and recommendations from individual industry members, the Task Force, and AAMA from the perspective that an amendment should be considered only if it is technically infeasible to construct a practical, wearable garment under the current provisions of the standards. The staff was not convinced that increases in the garment dimensions were necessary; they would also make garments less snug-fitting.

In the staff's view, the primary difficulties in producing functional garments under the standards were caused by the descriptions of and instructions for making garment measurements required by the standards. Garment measurements are required to be made at points that do not match the points of the body from which dimensions were obtained. Another potentially troublesome problem was the top of a 2-piece garment riding up to the waist, creating bunching of fabric in that area.

The staff identified four potential technical amendments to address these problems. The four potential amendments involved: (1) measurement of the upper arm as in the enforcement letter of

December 1996, (2) measurement of the seat as originally intended, (3) measurement of the thigh slightly below the crotch/inseam intersection, and (4) allowing the "hour glass" silhouette for the top of a 2-piece garment.

From August through December 1997, the staff sought input on the practicality, usefulness, and impact of these potential amendments from manufacturers, retailers, garment designers, textile experts, affected trade associations and others. These technical amendments did not involve changes in the body/garment dimensions specified in the current rules and would, therefore, not result in looser-fitting garments. The rationale for garment safety would remain tied to the garment's close contact with the body.

To help determine whether these technical amendments are needed (will they clarify requirements for the industry and result in practical garments), the staff conducted structured observations of garment practicality (similar to fittings) with children. The observations allowed the staff to evaluate a garment made to the current standards' provisions and other garments made according to the various amendments under consideration. In a limited way, the staff could also compare judgments about appropriate fit, evaluate the effect of consumer up-sizing (buying a garment a size or more larger than the child), and the effects of controlled and uncontrolled shrinkage. Industry members, who were producing and attempting to market snug-fitting garments, provided samples of their stock or prototype garments for the observations. This kind of study was not possible in earlier stages of the snug-fitting requirement's development because these garments did not exist.

1. Methodology

Three CPSC staff members with university level training/teaching experience in garment design and construction formed the evaluation team for the observations. The structure and activities of the observations and the specific observations to be emphasized were developed in consultation with recognized experts who teach apparel design (esp. childrenswear and actionwear), various manufacturers, and practicing designers.

The methodology for the observations is discussed separately and in detail by Human Factors in their memo, 'Methodology for

Structured Sleepwear Observations/ in **Tab D.** Children close to the standard body dimensions for their respective sizes were chosen to model the sleepwear garments. Children were observed putting on and taking off the garments, actively playing, "sleeping," and in specific poses for photographs. Observers looked for garment features causing binding or points of stress and signs of comfort/discomfort, such as the child adjusting the garment. They looked at garment "fit" vs. "tightness" (touching vs. constricting), all the while making the distinction between various design problems caused by the standard and others within control of the designer.

2. Observation Garments

The garments used in the observations included as many . different fabrics (three **1** x **1** rib knits, five interlock knits, and one thermal knit) and manufacturers (eight) as possible. One garment met all of the current standards' specifications for the various dimensions, including the seat measured at the bottom of the crotch. Another had an "hour glass" top. Other garments met specified dimensions as they would be measured in the technical amendments being considered. **(See Tab E.)**

VII. DISCUSSION

A. Garment Feasibility and Practicality (Tab E)

The one garment specially made to meet the current specifications was shown to be impractical for several reasons. Measuring the upper arm from the arm pit produces an armhole too small for comfort; further, it was not possible for the 4 year old model to remove the garment top without help from her parent. This is considered a major problem for a child who has otherwise mastered dressing herself. With the thigh and seat dimensions being measured at the same point, at the bottom of the crotch, both the thigh and seat dimensions had to be reduced in order to produce a proportional crotch seam. This resulted in an unnecessarily tight pant in the seat and thigh areas that would further restrict the fabrics that could be used successfully in this garment style.

The other observation garments were made in keeping with the possible technical amendments. A number of manufacturers produced garments that were wearable, comfortable, and suitable

for sleeping and active play. The designing of this style garment is not as simple as cutting down the dimensions of currently produced pajamas; according to many in the industry, the armhole design was particularly challenging. Although all designs were not equally successful in achieving the best elements of this form-fitting garment, as a group, they demonstrated that it can be done well.

Children (or parents in the infant's case) had no **problem** putting these pajamas on and removing them. Tops did not ride up to and remain at the waist like earlier garments the staff observed. Body coverage was maintained during activities and the stretch of the fabrics accommodated leg movement as well as bent elbows and knees. This allowed for squatting, bending, running and rolling without restriction. The stretch of the fabrics provided more than enough diaper ease for the infant model. Children reported no discomfort or other problems with sleeping overnight in these garments with one exception. Our oldest model is used to sleeping in very loose garments and found the snug-fitting pajamas uncomfortable.

When the children wore garments larger than those designed for them, the snug-fitting style still conformed to their bodies. The garments were closer fitting than T-shirts or traditionally styled pajamas, but not as snug-fitting as intended by the regulation.

Various shrinkage control methods were used among the garments in the observations, still allowing a reasonable fit after one laundering. The amount of stretch in these fabrics varied as well and is critical for the performance of this style garment. Fabrics that worked well in this style garment had stretch ranging from 65% to 85% as measured by an informal method presented by the Industry Task Force.

1. Parents' Comments

Parents came to the observations with varying expectations for the "tight-fitting', sleepwear. One parent commented that "These are much more like regular pajamas than I expected." Another said "I wouldn't buy these unless my daughter would wear them." Although these comments are anecdotal, the parents found the snug-fitting garments generally acceptable and came to

appreciate the value of stretch and its contribution to comfort of this style of garment.

2. Children's Comments

The children, all except the infant who could not yet talk well, stated that their garments were comfortable during the observation activities. The younger children were less able to articulate critically how a garment felt to them than the older children. The 10 and 12 year olds could make the distinction between comfortable fit when the garment was touching their body and uncomfortable fit when the garment was constricting in some way.

The 12 year old girl had very definite opinions about what style, color and pattern garments she would be willing to wear. Even though the garments "did not bind or anything," she was used to sleeping in much looser garments, and these snug-fitting pajamas felt uncomfortable by comparison. The other children (and infant's parents) noted that their garments felt fine for the sleeping at home segment of the observation.

3. Producer Perspective

Manufacturers of these and other snug-fitting cotton sleepwear have overcome a number of obstacles in the marketing of their products. They have chosen design features such as rib knit rather than hemmed cuffs at the wrists and ankles because they stretch enough to go over hands and feet easily. They have selected fabrics with adequate stretch, which has not been a concern in specifying fabric for sleepwear until now. Manufacturers have controlled shrinkage with compacting and garment washing. They have found ways to apply printing inks so the stretch is not adversely affected and so colors and patterns are pleasing even when the garment is stretched.

4. Tolerance

Manufacturers have also been successful with producing and marketing their sleepwear with the negative tolerance allowed by the current standards. Some manufacturers of observation garments undercut the size specifications and others carefully inspect production and resew seams where necessary to stay close to the maximum dimensions allowed. This is not to say they would not like to have a positive tolerance as well, but they have

managed their cutting and sewing operations to meet the needs of their retail customers and consumers.

At the February 18, 1998, meeting, some manufacturers of snug-fitting children's sleepwear requested that sewing tolerances greater than the dimensions specified in the standards be allowed for snug-fitting children's sleepwear (Tab F). Tolerances arenormally used in the production of all garments and allow for permissible variations to the pattern specifications that can occur during cutting or sewing of the garment. Variations can occur during cutting because the fabric is stacked into layers. It is reported that the top layers of the stack are cut most accurately and those garment pieces cut ` from the lower part of the stack are smaller than the pattern specifications. Computerized rather than manual cutting equipment reportedly corrects this problem. During sewing,. variations to the pattern specifications occur because the sewing operators are required to stitch the garments quickly.

Manufacturers establish tolerances to accommodate these variations to individual garments that occur during the manufacturing process. In some cases the retailer also establishes tolerances which the manufacturer must meet. Larger tolerances are often established for knit fabrics because even though care is taken, stretching still occurs during the cutting process. Undercutting (using patterns smaller than the specified dimensions) can address this problem, but some manufacturers are reluctant to "undercut" because these smaller garments may be perceived to be of poor quality.

There is no official standard tolerance used in the industry for snug-fitting sleepwear garments._ The staff reviewed typical manufacturer and retailer tolerances from four sources; one retailer's tolerances were specific for snug-fitting sleepwear **(Tab G)**. Tolerances ranged from ±1/4 to ±1/2 inch on a flat measure; when doubled to compare to the standards' specifications, ±1/2 to ±1 inch. The one retailer allows only a negative tolerance, e.g. -1/2 inch from the standard's specification for snug-fitting sleepwear.

Adding a positive tolerance to the standards could lead to overlapping sizes, i.e. garments could also meet the dimensions of the next larger size(s), resulting in less than snug-fitting

sleepwear garments. The difference between a specific dimension in one size and the next can be as little as 1/8 inch, as in the wrist.

The ease of ignition increases when the wearer's clothing stands away from the body, and the excess fabric functions as a connector to the ignition source. If ignition occurs, the availability of oxygen on the under side of the garment and the absence of a heat sink increases the opportunity for sustained burning.

Before proposing amendments to exempt snug-fitting sleepwear garments, Commission staff reviewed technical literature on this subject. This review of the literature confirmed the importance of fit and its influence on garment flammability. Although the literature review did not reveal a specific safe level or range of fit, there is some evidence that even a spacing of 1/8 inch between the fabric and the body can increase the likelihood of thermal injury. More heat may develop when the fabric is away from the body than when the fabric is next to the body.

With no production tolerances (except for a diaper allowance in the smaller sizes), manufacturers of garments sold under the stay of enforcement found ways to produce an acceptable garment. that consumers purchased for use as children's sleepwear. Other manufacturers are producing snug-fitting children's sleepwear to or below the garment dimensions established by the Commission and are experiencing good to reasonable sales with no return problems. This may be due to accurate cutting equipment, careful choice of fabrics, and careful planning before and during the manufacturing process to build in tolerances to the pattern so that the finished garment will meet the required specifications.

To summarize, adding a positive production tolerance would effectively increase the garment dimensions specified in the standard, compromising the garment's safe design or snug-fit.

B. Suggested Amendments to the Standards

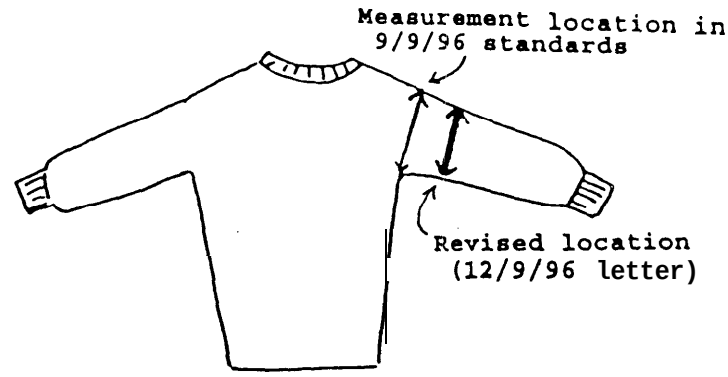
The structured observations showed that the current specifications need several minor changes to make it possible to

produce practical snug-fitting garments. The following is a discussion of these potential amendments as they relate to ensuring that garment dimensions are measured in the appropriate locations for accuracy and reasonable fit. Refer to the revised measuring instructions and drawings in **Attachment 6 of Tab E.**

Measurement of Upper Arm

The garment constructed to meet the current requirement of the upper arm dimension measured at the armhole demonstrated that the armhole is too small and, therefore, uncomfortable to the wearer. This garment showed another equally serious problem of the small armhole making the garment impossible for the child to remove.

The staff evaluated other garments made with upper arms measured as in the December 9, 1996, enforcement letter. The upper arm measurement point was moved from the armpit of the garment to the halfway point between the shoulder and the elbow. This coincides with the point on the body where the upper arm measurements are made for the specifications in the standards. Several other options discussed in Tab E were also considered and rejected.



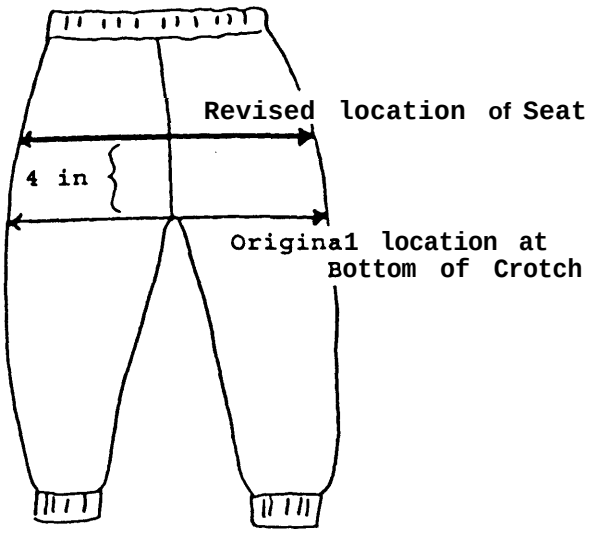
Upper Arm Measurement

Although the measurement method in the enforcement letter **(Attachment F in Tab D)** is somewhat complicated, it produced a more accurate upper arm measurement point on the garments evaluated than the current method. In all cases, the measurement was made about midway between the shoulder and elbow or a little lower.

Measurement of Seat

The language in the current standards states that the seat measurement is taken at "the widest location between waist and crotch," a typical though imprecise description used in the

industry. This location has been read literally, **leading to** an incorrect measurement at a point immediately above the bottom of the crotch and essentially at the same location where the thigh measurement is taken. This is not where seat/hip measurements are normally made in the industry, and it was not the intent of the regulation to measure in an unusual location.

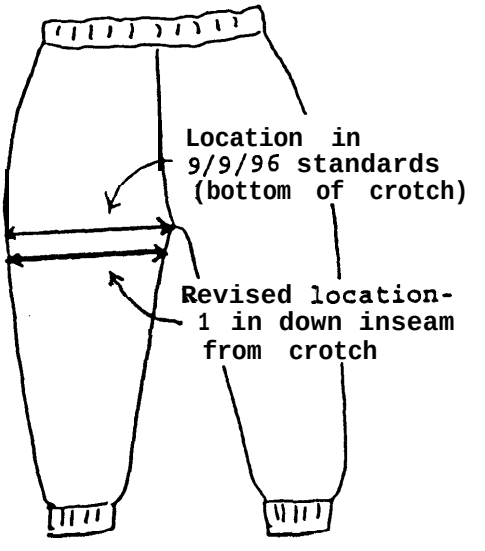


Seat Measurement

The staff considered several measurement options during the garment observations by marking them on the garments. The staff preferred the option of measuring the seat at a mark 4 inches above the crotch. This gave a more consistent and accurate seat measurement location (in terms of matching the body part intended) for all garments than either the current regulation or other options discussed in Tab E. CPSC staff measured over a dozen manufacturers' garments in various sizes of this style and confirmed that the garment dimensions do not change between the end of the curve in the crotch seam and the waist (where this measurement is made). This helps insure accurate measurements. Further, the same distance above the crotch for all sizes simplifies compliance monitoring efforts.

Measurement of Thiah

The standards require the thigh measurement to be taken at the bottom of the crotch. In a form-fitting garment such as this, the bottom of the crotch seam does not actually touch the thigh, making the measurement inaccurate. It is typical practice in the industry to measure the thigh at a point **1** inch down the inseam from its intersection with the crotch seam. This shift in measurement

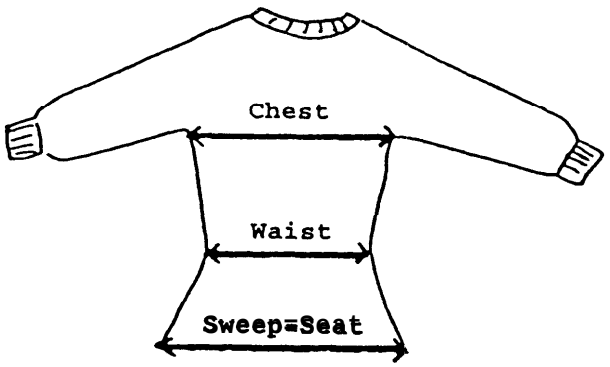


Thigh Measurement

point gives a more accurate measure of the garment at the thigh without interference from the bulky seam intersection. This reduces garment restriction in the crotch area and, according to AAMA designers, allows them to design a better fitting crotch, Even in the droopy crotch designs the staff observed, this lowered measurement point was touching the thigh. With the best fitting pants of garments in our observations, it was clear that this 1 inch from the crotch seam is needed for an accurate thigh measurement.

Sweep Measurement on the Top of a 2-piece Garment

The sweep (bottom of the top garment) must currently be equal to or less than the waist dimension specified in the standards. The staff considered another option with the potential to reduce fabric bunching at the waist or produce a more functional garment: the "hourglass" silhouette currently specified in the standards for one-piece garments. The sweep could be as large as the specified seat dimension, and the narrowest part of the top between the sweep and the chest measurement could equal the specified waist dimension. Several manufacturers thought this option might be helpful for larger girls sizes where the seat is considerably larger than the waist, but not helpful for other sizes. For the observation, a girl's size 12 garment was constructed with a conservative hour glass silhouette; the sweep was equal to the smaller chest dimension required by the standard.



"Hourglass" Silhouette

The top of the observation garment fit nicely while the model stood still; however, when she raised her arms or moved during the observation, the sweep flared away from the body significantly. The concept of snug-fitting is readily defeated

with the hour glass silhouette in a 2-piece garment. For this reason, the staff is not recommending this option.

VII. INFORMATION & EDUCATION CAMPAIGN

After the Commission issued the snug-fitting amendments in 1996, CPSC staff and the AAMA developed materials for a consumer information and education campaign. These included an informative hang tag for garments, a consumer brochure, a fact sheet and other background information. These materials explained the snug-fitting concept and described the importance of fabric and fit as important safety considerations for purchasing children's sleepwear. AAMA distributed materials for the campaign to their members and other interested parties. Tentative plans for a press conference to kick off the campaign were postponed while the Commission considered possible technical amendments to the snug-fitting requirements.

More recently, AAMA members reported that they will wait until any changes in the standard become final before deciding to go ahead with the full I&E campaign. On February **18, 1998,** the Commission staff met with manufacturers and retailers currently marketing the snug-fitting sleepwear to discuss cooperative efforts to inform consumers of the availability and safety of the snug-fitting sleepwear. See Tab F. A number of manufacturers (non-AAMA members) reported that they are using the AAMA hang tag or the tag language with other artwork on their garments. Further, some retailers are beginning to use in-store posters with the same safety information to assist consumers in becoming familiar with this new style of sleepwear. With the increasing availability of snug-fitting garments, maintaining a consistent message for consumers is considered essential for encouraging safety-conscious purchasing choices. There is no formal industry coordination of these consumer information efforts at this time.

IX. CONCLUSIONS

The structured observations confirmed earlier industry concerns that strict adherence to the measurement points as currently described in the children's sleepwear flammability standards would produce impractical, unwearable garments. The CPSC staff also concluded that comfortable, practical, snug-fitting children% sleepwear garments can be produced with slight changes in the standards. Several technical (clarifying)

amendments are needed for garment measurements of required dimensions to be accurate (correspond to the appropriate part of the body) and to insure proper fit of the garments. The following table shows the measurement locations for the upper arm, seat, and thigh as currently given in the flammability standards and the recommended changes.

Where to Measure Garments to Determine Conformance to the Flammability Standards		
Dimension	**Current Flammability Standards**	**Staff Recommendations**
Upper Arm	**Measure at a line perpendicular to the sleeve, extending from the outer edge of the sleeve to the arm pit.**	**Measure at the midpoint between the shoulder and elbow.** **This recommendation has already been implemented by the December 9, 1996, enforcement letter from the Office of Compliance to manufacturers, retailers and importers.**
Seat	**On one-piece garment, measure at the widest location between waist and crotch.** **On two-piece garment, take this measurement on lower piece only.**	**Measure 4 inches above the bottom of the crotch for all sizes.**
Thigh .	**Measure at a line perpendicular to the leg, extending from the outer edge of the leg to the crotch.**	**Measure 1 inch down the inseam below the bottom of the crotch.**

The staff's recommendations for these technical amendments are based upon numerous inputs from the manufacturers, importers, designers, and textile and clothing experts. These amendments are limited to those considered necessary for the production of safe, snug-fitting garments, as defined by maintaining contact with the body at key points. Many other suggestions by manufacturers and retailers were judged unnecessary because the goal can be attained with appropriate fabrics, certain style

features (e.g. ribbed cuffs at the wrists and ankles), and appropriate pattern designs The structured observations of actual garments worn by children confirmed that the construction of practical snug-fitting garments is feasible. Further, a number of manufacturers report that they have overcome many production problems and are successfully marketing the snug-fitting garments with few customer returns.

Because of misinterpretations observed by the Compliance staff, the enforcement regulations should also be revised to clarify the acceptability of marketing and promoting snug-fitting sleepwear alongside traditional flame resistant sleepwear.

The technical amendments and enforcement policy changes recommended here are incorporated in two draft *Federal Register* notices (Tabs H and I, respectively).

X. OPTIONS

The following options are available to the Commission:

1. Decline to make any changes to the children's sleepwear standards and/or the enforcement policy.

2. Issue a *Federal Register* notice that proposes technical changes to the children's sleepwear standards.

3. Issue a *Federal Register* notice that proposes changes to the enforcement policy clarifying the recommended segregation of complying sleepwear.

XI. RECOMMENDATION

The staff recommends that the Commission issue the Notice of Proposed Rulemaking with minor changes to the children's sleepwear standards in the *Federal Register* as drafted by the staff for public comment. If the Commission chooses to issue these proposed amendments, the staff further recommends that no enforcement action be taken against manufacturers who choose to use the proposed points of measurements. The use of the measurement points specified in the 1996 amendments would still be acceptable until any new changes become effective.

The staff also recommends that the Commission issue for public comment the proposed changes to the enforcement policy clarifying the recommended segregation of complying sleepwear.

Tab A

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

MEMORANDUM

DATE : MAR 30 1998

TO: Margaret L. Neily, Project Manager, ESME

Through: Mary Ann Danello, Ph.D., Associate Executive Director
Directorate for Epidemiology and Health Sciences
Susan Ahmed, Ph.D., Director, Division of Hazard Analysis

FROM: C. Craig Morris, Ph.D., EHHA

SUBJECT: Clothing-Related Thermal Burn Injuries in Children under 15 Years Old

As you have requested, attached please find an updated Division of Hazard Analysis report on clothing-related thermal burn injuries in children under 15 years old.

Clothing-Related Thermal Burns in Children under 15 Years Old.

March 1998

C. Craig Morris, Ph.D.
U.S. Consumer Product Safety Commission
Directorate for Epidemiology and Health Sciences
Division of Hazard Analysis
4330 East West Highway
Bethesda, MD 208 14

Executive Summary

A 1994 U. S. Consumer Product Safety Commission (CPSC) report described clothing-related thermal burn injuries and deaths among children under 15 years old from 1970 to 1994.[1] The present report describes such injuries and deaths during the period from 1970 to 1997. Data sources include the CPSC's National Electronic Injury Surveillance System (NEISS), the National Center for Health Statistics' E-code mortality file, and population data files from the U.S. Bureau of the Census.

Clothing-related thermal burn fatalities declined sharply during the 1970's. Among children O-14 years, 60 deaths occurred in 1970, 15 in 1975, 7 in 1980, and 6 or less each year thereafter through 1995. Similar declines occurred in all age groups, but more deaths occurred among older people. Among adults 65 and over, 455 deaths occurred in 1970, 280 in 1975, 2 15 in 1980, 164 in 1985, 117 in 1990, and 123 or fewer each year thereafter through 1995.

NEISS data on reported hospital emergency room-treated injuries among children under 15 years old revealed no annual trend in clothing-related thermal burn injuries from 1980 to 1997. Males were more likely than females to be involved in about 60% of these injuries. None of the reported NEISS injuries to children under 15 years old involved children less than 2 years old, 2% involved children 2 years old, and 98% were about evenly distributed across the ages from 3 to 14 years.

CPSC in-depth investigations from 1993 to 1997 revealed that none of the 32 thermal-burn incidents involving garments used as sleepwear involved "stay of enforcement" garments or garments exempt from current sleepwear flammability standards (certain tight-fitting garments and garments sized for infants 9 months old and under). These investigations included one consumer-reported incident involving a 15-month-old victim wearing traditional flame resistant sleepwear. These investigations also revealed that the most frequent and severe sleepwear-related thermal burn injuries involved oversize, loose-fitting T-shirts.

[1] *Injury Data Related to the Children's Sleepwear Standards*, T. L. Kissinger, CPSC, 1995.

Table of Contents

	Page
Executive Summary	ii
I. Clothing-Related Thermal Bum Injuries	
A. Method	1
B. Annual Trends	1
C. Gender, Age, and Disposition	3
II. Clothing-Related Thermal Bum 'Fatalities	
A. Method	5
B. Annual Trends	5
III. Hazard Patterns in Sleepwear-Related Thermal Burn Incidents	9
IV. Conclusion	9

I. Clothing-Related Thermal Burn Injuries

A. Method

The U.S. Consumer Product Safety Commission's (CPSC's) National Electronic Injury Surveillance System (NEISS) collects data on hospital emergency room-treated injuries via a probability sample of hospitals across the United States and its territories.[2] A 1995 CPSC report presented NEISS estimates of clothing-related thermal bum injuries to children under fifteen years of age for the calendar years 1980 through 1994. The case selection criteria included product codes 1644 (Nightwear), 1645 (Daywear), 1658 (Unspecified Clothing), or 1677 (Other Clothing), diagnoses 5 1 (Thermal Bums) or 47 (Unspecified Bums), and age under 15 years old. NEISS comments were reviewed to eliminate cases not involving the burning of clothing while worn by the victim. Such cases included, for example, bums while ironing clothes. In the present report, previously reported estimates' for the years 1980 to 1994 are presented along with estimates for the years 1995 to 1997.

B. Aunual Trends

Estimates of reported clothing-related thermal burn injuries to children under 15 years of age for the calendar years 1980 to 1997 appear in **Figure 1.** More injuries reportedly involved Daywear than any other type of clothing for every year from 1980 to 1997. None of the four types of clothing or the total showed an increasing or decreasing linear annual trend

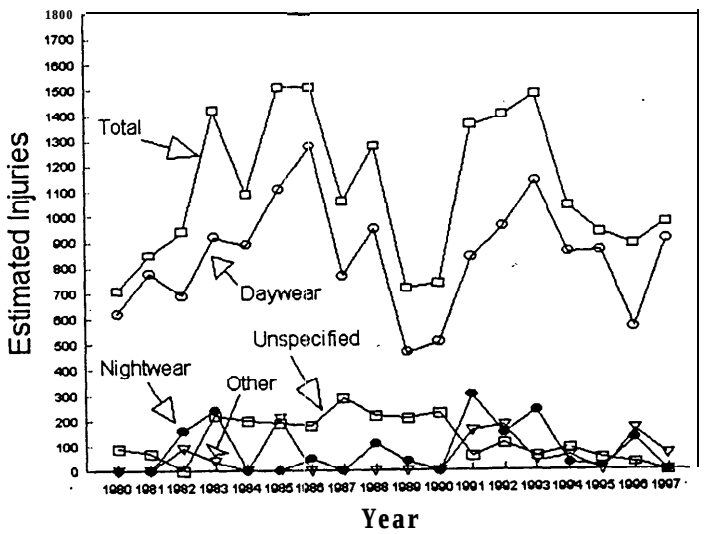


Figure 1. Clothing-Related Thermal Burn Injuries in Children under 15 Years Old from 1980 to 1997. Source: National Electronic Injury Surveillance System.

[2] *The NEISS Sample* (Design *and Implementation)*, E. Kessler, CPSC, 1995.

in injuries. As shown in **Table 1,** correlations with year were nonsignificant for Total clothing-related thermal burn injuries (r = .03), Daywear-related injuries (r = .03), Nightwear-related injuries (r = .12), Other clothing-related injuries (r = .27), and Unspecified clothing-related injuries (r = -.34).[3]

Table 1

Correlation Matrix for Year and Clothing-Related Thermal Burn Injuries

	Total	Daywear	Nightwear	Other	Unspecified
Year	.03	.03	.12	.27	-.34
Total		.87	.52	.40	.16
Daywear			.19	.15	.02
Nightwear				.40	-.24
Other					-.34

Source: U.S. Consumer Product Safety Commission, 1998.

Table 2 pools estimates for each type of clothing and the total across the entire 18-year period from 1980 to 1997. The estimated annual average number of reported clothing-related thermal burn injuries was 840 (76.0%) for Daywear, 80 (7.4%) for Nightwear, 60 (5.1 %) for Other clothing, and 130 (11.6%) for Unspecified clothing.

Table 2

Estimated Clothing-Related Thermal Burns from 1980 through 1997

Type	Annual Average	18-Year Total	Percent of Total
Daywear	840	15,130	76.0
Nightwear	80	1,470	7.4
Other	60	1,010	5.1
Unspecified	130	2,300	11.6
Total	1,110	19,920	100.0

Source: National Electronic Injury Surveillance System, U.S. Consumer Product Safety Commission, 1998. Note: details may not sum to total due to rounding.

[3] None of these Pearson product moment correlation coefficients approached the critical value $|r|$ = .4683 required for significance in a two-tailed t test with DF = 16 and a = .05.

The 95% confidence interval for the annual estimate of 1,110 total injuries is approximately 1 ,110 ± 550, based on a generalized relative sampling error[4] of **0.25.** Smaller NEISS estimates are associated with much, larger relative sampling errors, so confidence intervals for smaller NEISS estimates are not reported here.

C. Gender, Age, Treatment Disposition

Table 3 gives pooled NEISS estimates for 1980 through 1997 by gender and type of clothing (Daywear or Nightwear). Overall, about 50% more injuries involved males (61%) than females (39%). However, there was a crossing interaction of gender and type of **clothing:** Daywear-related injuries involved more males (63%) than females (37%), but Nightwear-related injuries involved more females (62%) than males (38%). The interaction must be interpreted cautiously because of the small number of cases involving Nightwear.

Table 3

Estimated Daywear- and Nightwear-Related Thermal Burns
from 1980 through 1997 by Victim Gender

	Daywear	Nightwear	Total
Male	9,650	580	10,230
Female	5,660	940	6,600

Source: National Electronic Injury Surveillance System, U.S. Consumer Product Safety Commission, 1998. Note: details may not sum to total due to rounding.

Table 4 gives pooled NEISS estimates of clothing-related thermal burns for 1995 through 1997 by treatment disposition and victim gender. Estimates are combined for all four types of clothing reports (Daywear, Nightwear, Other, Unspecifed). About 24% of the total estimated number of injured victims were hospitalized or treated and transferred to another facility; the remaining 76% were treated and released.

---

[4] *National Electronic Injury Surveillance System (NEISS) Estimated Generalized Relative Sampling Errors,* Kessler, E. and Schroeder, T., CPSC, 1997. The authors give formulas for both the generalized relative sampling error and an associated 95 % confidence interval defined as $E \pm M$, where E is the NEISS estimate, $M = 1.96\ E/(1.70282\ LN(E) - 7.94958)$, and $LN(E)$ is the natural log of the estimate E. The formula, based on 1996 estimates, provides an excellent approximation for the years 1990 to 1996.

Table 4

Estimated Clothing-Related Thermal Burns from 1995 through 1997 by Treatment Disposition and Victim Gender

	Treated & Released	Treated & Transferred	Hospitalized	Total
Male	1,460	200	320	1,980
Female	670	110	30	820
Total	2,130	310	360	2,800

Source: National Electronic Injury Surveillance System, U.S. Consumer Product Safety Commission, 1998. Note: details may not sum to total due to rounding.

Table 5 gives pooled NEISS estimates of clothing-related thermal bums for the years 1995 through 1997 by victim age. Estimates are combined for all four types of clothing reports (Daywear, Nightwear, Other, Unspecifed). Estimated injuries were fairly evenly distributed across the ages from three to fourteen years old. Two percent of the estimated injuries involved victims two years old, and there were no reported injuries involving victims under two years old.

Table 5

Estimated Clothing-Related Thermal Burns from 1995 through 1997 by Victim Age

Age (years)	Estimated Number	Percent
l-2	70	2
3-4	420	15
5-6	660	23
7-8	300	11
9-10	460	16
11-12	290	10
13-14	620	22
Total	2,800	100

Source: National Electronic Injury Surveillance System, U.S. Consumer Product Safety Commission, 1998. Note: details may not sum to total due to rounding.

II. Clothing-Related Thermal Burn Fatalities

A. Method

The National Center for Health Statistics (NCHS) compiles data on deaths in the United States. These deaths are classified in accordance with the International Classification of Diseases (ICDA). E-code 893 in the Ninth Revision of the ICDA denotes a death due to clothing-related therrnal burns. A 1995 CPSC report on clothing-related thermal bum injuries' presented the number of deaths classified under E893 by age group for the 1970-199 1 period. In addition, population data from the Bureau of the Census were used to estimate fatality rates by age group for the same period. The present report provides comparable estimates for the period 1992- 1995 and presents them with estimates for 1970- . 1991 from the 1995 CPSC report.

B. Annual Trends

Figure 2 gives data (E-code 893) from 1970 to 1995 for children O-4 and 5-14 years old. Clothing-related thermal burn fatalities declined sharply during the 1970's. Among children 0- 14 years old, 60 deaths occurred in 1970, 15 in 1975, 7 in 1980, and 6 or less each year thereafter through 1995. As shown in **Table** 6, similar declines occurred in all age groups, but more deaths occurred among older people. Among adults 65 and over, 455 deaths occurred in 1970, 280 in 1975, 215 in 1980, 164 in 1985, 117 in 1990, and 123 or fewer each year thereafter through 1995. Table 6 gives fatality data for the age groups O-4 years, 5-l 4 years, 15-24 years, 25-44 years, 45-64 years, and 65+ years. To assess the significance of the negative nonlinear trends from 1970 to 1995 in Table 6 and Figure 2, a logarithmic transformation was performed on year.[5] Product moment correlations of deaths with log-year were all strong and significant: -.90 for O-4 years, -.92 for 5-14 years, -.88 for 15-24 years, -.92 for 25-44 years, -.98 for 45-64 years, -.99 for 65+ years, and -.99 for all ages combined.' These strong negative correlations indicate that decreasing logarithmic functions accurately describe the downward trends in fatalities in Figure 2 and Table 6. In other words, the decline in deaths was steepest in the early 1970's, less steep in the later 1970's, and flattened out in the 1980's.

---

[5] The natural-log transformation was LYear = log(Year-1969). Graphic plots of deaths against log-transformed year yielded linear functions, with Pearson product moment correlations approaching -1 .OO.

[6] The absolute value of the Pearson product moment correlation coefficient must exceed $|r| = .3809$ for statistical significance in a two-tailed t test with $DF = 25$ and a = .05.

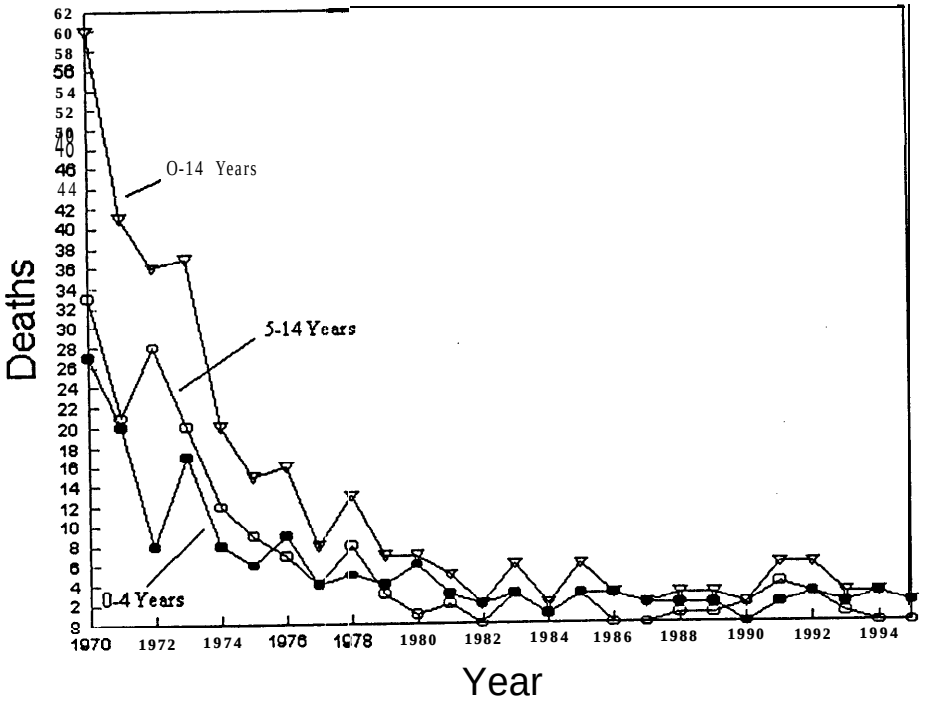


Figure 2. Clothing-Related Thermal Burn Deaths in Children under 15 Years Old from 1970 to 1995. Source: National Center for Health Statistics E-code File.

Table 6. *Clothing-Related Thermal Burn Fatalities from 1970 through 1995*
(E-code 893)

Year	Age in Years o-4	5-14	15-24	25-44	45-64	65+	Total
1995	2	0	3	10	25	110	150
1994	3	0	3	12	24	108	150
1993	2	1	1	5	26	123	158
1992	3	3	1	15	27	104	153
1991	2	4	2	14	22	118	162
1990	0	2	2	6	34	117	161
1989	2	1	4	23	33	158	221
1988	2	1	0	13	30	159	205
1987	2	0	1	5	26	166	200
1986	3	0	2	11	24	139	179
1985	3	3	5	10	49	164	234
1984	1	1	5	12	40	165	224
1983	3	3	5	11	53	195	270
1982	2	0	7	18	38	195	260
1981	3	2	4	14	53	229	305
1980	6	1	4	18	66	215	310
1979	4	3	7	17	54	205	290
1978	5	8	5	12	62	232	324
1977	4	4	6	24	73	265	376
1976	9	7	4	27	89	289	425
1975	6	9	14	23	97	280	429
1974	8	12	8	24	104	289	445
1973	17	20	7	35	117	321	517
1972	8	28	12	34	104	356	542
1971	20	21	13	42	161	398	655
1970	27	33	15	50	180	455	760
Total	137	163	132	443	1,509	5,110	7,494

Source: E-Code file, National Center for Health Statistics, and 1998.
Note: details may not sum to total due to rounding.

Table 7 gives fatality rates (deaths per million people) derived from data in Table 6 and annual population data from the Bureau of the Census. Among children O-4 years old, the fatality rate was 1.57 in 1970, 0.37 in 1975, 0.37 in 1980, and 0.18 or less each year thereafter through 1995. Among adults 65 and over, the fatality rate was 22.78 in 1970, 12.34 in 1975, 8.41 in 1980, 5.77 in 1985, 3.76 in, 1990, and 3.75 or fewer each year thereafter through 1995.

Table 7. *Clothing-Related Thermal Burn Fatalities per Million People from* **1970** through *1995 (E-code 893)*

Year	Age in Years 0-4	5-14	15-24	25-44	45-64	65+	Total
1995	0.10	0.00	0.08	0.12	0.48	3.28	0.57
1994	0.15	0.00	0.08	0.14	0.47	3.26	0.58
1993	0.10	0.03	0.03	0.06	0.52	3.75	0.61
1992	0.15	0.08	0.03	0.18	0.56	3.22	0.60
1991	0.10	0.11	0.05	0.17	0.47	3.72	0.64
1990	0.00	0.06	0.05	0.07	0.74	3.76	0.65
1989	0.11	0.03	0.11	0.29	0.72	5.15	0.90
1988	0.11	0.03	0.00	0.17	0.66	5.28	0.84
1987	0.11	0.00	01.03	0.06	0.58	5.60	0.83
1986	0.17	0.00	0.05	0.15	0.54	4.79	0.75
1985	0.17	0.09	0.13	0.14	1.10	5.77	0.98
1984	0.06	0.03	0.12	0.17	0.90	5.92	0.95
1983	0.17	0.09	0.12	0.16	1.19	7.13	1.15
1982	0.12	0.00	0.17	0.27	0.85	7.28	1.12
1981	0.18	0.06	0.09	0.21	1.19	8.73	1.33
1980	0.37	0.03	0.09	0.29	1.48	8.41	1.37
1979	0.25	0.08	0.16	0.28	1.22	8.16	1.29
1978	0.32	0.22	0.12	0.20	1.40	9.47	1.46
1977	0.26	0.11	0.14	0.42	1.65	11.09	1.71
1976	0.58	0.19	0.10	0.49	2.02	12.41	1.95
1975	0.37	0.24	0.35	0.43	2.21	12.34	1.99
1974	0.49	0.3 1	0.20	0.45	2.39	12.10	2.09
1973	1.01	0.51	0.18	0.68	2.71	14.91	2.45
1972	0.47	0.70	0.32	0.68	2.43	16.94	2.59
1971	1.16	0.52	0.35	0.86	3.79	19.36	3.17
1970	1.57	0.81	0.42	1.04	4.30	22.78	3.74

Source: derived by U.S. Consumer Product Safety Commission using mortality data from the National Center for Health Statistics and population data from the Bureau of the Census, 1998. Note: details may not sum to total due to rounding.

To assess the significance of the nonlinear negative trends from 1970 to 1995 in Table 7, a logarithmic transformation was performed on year (see note 4). Product moment correlations of risk with log-year were all strong and significant: -.91 for O-4 years, -.92 for 5-14 years, -.89 for 15-24 years, -.96 for 25-44 years, -.98 for 45-64 years, -1 .OO for 65+ years, and -1 .OO for all ages combined (see note 5 about significance test). These strong negative correlations indicate that decreasing logarithmic functions accurately describe the trends in risk shown in Table 7. In other words, the decline in risk was steepest in the early 1970's, less

steep in the later 1970's, and gradually flattened out in the 1980's.

III. Hazard Patterns in Children's Sleepwear-Related Thermal Burn Incidents

CPSC's in-depth investigations (INDP) file revealed 131 investigations of clothing-related thermal bum incidents by CPSC staff from 1993 to 1997. Among these 13 1 incidents, CPSC staff identified 32 cases involving children wearing sleepwear or garments used as sleepwear. Of the 32 sleepwear-related cases, 2 1 involved males and 11 involved females. The ages of the victims ranged from 15 months to 11 years, with a median of 6.0 years and average of 6.1 years. The incident involving a 15-month-old victim was reported to CPSC by a consumer complaint, not through NEISS. The 15-month-old victim was wearing a traditional flame resistant,1 00% polyester "blanket sleeper" that was ignited by a spark from a fireplace. The 32 cases were classified into three categories: oversize or loose-fitting T-shirts (n = 23), traditional (flame resistant) sleepwear (n = 5), and "unusual" garments (n = 4). The "unusual" sleepwear garments (and associated injuries) included a tight-fitting T-shirt too small for the child (minor bums), loose-fitting cotton pajamas (20% body bums and required skin grafts), an adult gown (first and second degree bums), and an adult nightshirt (10 days hospitalization). The loose fitting pajamas appeared to be noncomplying sleepwear: although the mother described the garment as "loose fitting pajamas," the persistent burning of the garment (as described by the mother) is inconsistent with the flame resistant property of complying sleepwear. The in-depth investigations revealed that none of the 32 incidents involved "stay of enforcement" garments or garments exempt from current sleepwear flammability standards (certain tight-fitting garments and garments sized for infants 9 months old and under).

Seven sources of ignition were identified in the 32 cases: cigarette lighters (n = 14), stoves (n = 8), matches (n = 3), candles (n = 2), space heaters (n = 2), fireplaces (n = 2), and a halogen light (n = 1). The burn injuries in these cases were usually severe: 13 of the 23 T-shirt-related incidents resulted in hospitalization and 13 involved 3rd-degree burns; 2 of the 4 unusual garment incidents resulted in 3rd-degree bums and hospitalization; and none of the 5 flame resistant sleepwear incidents resulted in hospitalization, although 2 of these cases reportedly did involve localized 3rd-degree burns. Thus, of the 32 incidents, 15 resulted in hospitalization and 17 resulted in 3rd-degree bums.

IV. Conclusion

A 1994 U. S. Consumer Product Safety Commission (CPSC) report described clothing-related thermal bum injuries and deaths among children under 15 years old from 1970 to 1994. The present report describes such injuries and deaths during the period from 1970 to 1997. Data sources include the CPSC's National Electronic Injury Surveillance System (NEISS), the National Center for Health Statistics' E-code mortality file, and population data files from the U.S. Bureau of the Census.

Clothing-related thermal bum fatalities declined sharply during the 1970's. Among children 0- 14 years old, 60 deaths occurred in 1970, 15 in 1975, 7 in 1980, and 6 or less each year thereafter through 1995. Similar declines occurred in all age groups, but more deaths occurred among older people. Among adults 65 and over, 455 deaths occurred in 1970, 280 in 1975, 215 in 1980, 164 in 1985, 117 in 1990, and 123 or fewer each year thereafter through 1995.

NEISS data on reported hospital emergency room-treated injuries among children under 15 years old revealed no annual trend in clothing-related thermal bum injuries from 1980 to 1997. Males were more likely than females to be involved in about 60% of these injuries. None of the reported NEISS injuries to children under 15 years old involved children less than 2 years old, 2% involved children 2 years old, and 98% were about evenly distributed across the ages from 3 to 14 years.

CPSC in-depth investigations from 1993 to 1997 revealed that none of the 32 thermal-bum incidents involving garments used as sleepwear involved "stay of enforcement" garments or garments exempt from current sleepwear flammability standards (certain tight-fitting garments and garments sized for infants 9 months old and under). These investigations included one consumer-reported incident involving a 15-month-old victim wearing traditional flame resistant sleepwear. These investigations also revealed that the most frequent and severe sleepwear-related thermal burn injuries involved oversize, loose-fitting T-shirts.

Tab B

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

MEMORANDUM

DATE: April 9, 1998

TO : Margaret L. Neily
Project Manager

Through: Warren J. Prunella, AED, EC

FROM : Terrance R. Karels, EC TRK

SUBJECT: Children's Sleepwear Update

You asked that we provide updated information regarding sales of children's sleepwear. Attached is a table compiled by the NPD Group showing sales of children's apparel by types. The Group produces the National Purchase Diary, based on a national shoppers' panel of 16,000 households.

Unit sales of children's sleepwear have increased from 1993 to 1996 by about 28 percent, (36 million pieces). Inasmuch as the exemption for tight fitting sleepwear did not occur during this period, this gain reflects an increase in sales of traditional FR sleepwear garments. A spokesperson for the American Apparel Manufacturers Association (AAMA) stated that she was not aware of the reason for this increase. However, the increase in number of units sold is relatively small compared to other children's clothing, and may reflect increased gift purchases in a growing overall economy.

Unit sales of children's underwear also increased over the period, by about 22 percent (98 million pieces). **Earnshaw's,** considered the definitive clothing trade publication, attributed this gain to underwear used as sleepwear, the category of garments subject to the Commission's 1993 Stay of Enforcement.

The table also shows an 8 percent increase in children's playwear (143 million pieces). The **Statistical Abstract of the United States (1995,** 1997) reported that there was a 9 percent increase in the U.S. population of children (through age 14) over the period 1993 to 1996.

Members of the AAMA reportedly represent some 80% of children's sleepwear sales, by volume. The AAMA stated that none of its members now produce exempted tight fitting children's sleepwear. CPSC staff is aware of a small number of firms which are producing the exempted garments, but it is not known whether

other firms will enter the market for these garments. Staff contacted five manufacturers and importers of children's sleepwear of all types in order to develop information on the current market situation. While this information is anecdotal, it nonetheless provides information on the market conditions affecting these manufacturers.

Garments under the Stay

All marketers reported that they are no longer producing garments that were subject to the stay. One firm reported that it has only a few hundred such garments remaining in inventory, and these are being sold at reduced price. Another reported that all stocks of these garments have been shipped to retailers, while another expects to finish shipping soon.

Exempted Garments

These firms reported that developing cutting patterns (or templates) to the dimensions of the exemption was a significant problem, even though the patterns are commonly produced by computer. Several firms reported that they are having difficulty adapting existing patterns to the dimensions of the exemption and still produce comfortable, sellable garments. One firm is considering reverting to producing only polyester sleepwear for the 1999 selling period after experiencing returns from consumers of about 10 percent. Another firm stated that it is not producing exempted garments because of difficulty in finding suitable stretch fabrics. For importers, there was an additional difficulty in convincing overseas producers that the garments must be no larger than specified.

After pattern development, however, production of exempted garments is no more difficult than that of conventional sleepwear. They reported that cutting techniques are the same, but that sewing is harder with stretch materials. The president of one firm stated that, since the exemption did not allow for production variance, he designed the exempted garments slightly smaller than allowed; he reported that retailer acceptance has been good, shipping substantial quantities in the last quarter of 1997. He also reported that he had no consumer returns as of January 21, 1998; he further stated that returns would have begun if there were a widespread consumer acceptance problem.

These manufacturers reported that, since the exempted garments are smaller, less material is used. However, one firm stated that stretch cotton fabric is slightly more expensive, which offsets the reduced yardage of materials needed.

Traditional Garments

Firms reported that sales of sleepwear of polyester continue' at about the same levels. Firms stated that retailers are demanding both types of sleepwear, because of price differences (cotton garments are slightly more expensive at retail) and demand for certain styles of garments.

One reason cited for the continued popularity of conventional sleepwear garments is that polyester is no longer considered an undesirable fabric. Improvements in polyester fleece have increased consumer acceptance of garments of this fabric.

Attachment

Environmental Impact

Pursuant to the National Environmental Policy Act, and in accordance with the Council on Environmental Quality regulations and CPSC procedures for environmental review, a preliminary review of the potential environmental effects of the proposed revisions was conducted. The proposed revisions would not require or encourage significant product modifications, and would not cause manufacturers to dispose of existing packaging or materials of construction. Existing inventories of finished products, including those at retail, would not be rendered unusable because of the revisions. Further, no inventories would require retrofit in order to comply with the proposal.

The revisions are not expected to have a significant effect on the materials used in the production or packaging, or in the amount of products discarded after the revisions. Therefore, no significant environmental effects will result from the proposed revisions to the location of measurement of exempted sleepwear garments.

U.S. RETAIL SALES OF CHILDREN'S APPAREL

SLEEPWEAR
UNITS (mils)

	ANN 93	ANN 94	ANN 95	ANN 96	UNIT CHANGE 93/94	94/95	95/96
TOTAL	126.5	139.5	150.6	162.6	13.0	11.1	12.0
INFANT (I-2)	47.8	55.8	66.5	75.4	8.0	30.7	8.8
GIRLS (3-7)	31.5	33.0	33.9	33.5	1.5	0.9	-0.4
GIRLS (8-13)	21.9	22.6	19.8	23.1	0.7	-2.8	3.3
BOYS (3-7)	18.6	20.3	23.3	22.6	1.7	3.0	4.7
BOYS (8-14)	8.7	7.7	7.1	8.0	1.0	-0.6	0.9

UNDERWEAR
UNITS (mils)

	ANN 93	ANN 94	ANN	ANN 96	UNIT CHANGE 93/94	94/95	95/96
TOTAL	435.4	478.6	491.8	532.9	43.2	13.2	41.1
INFANT (1-Z)	75.5	78.8	82.3	97.5	3.3	3.5	15.2
GIRLS (3-7)	96.3	111.6	114.0	114.3	15.3	2.4	0.3
GIRLS (8-13)	79.2	81.7	95.4	163.1	12.3	3.7	7.7
BOYS (3-7)	86.0	88.2	90.0	97.7	2.2	1.8	7.7
BOYS (8-14)	98.4	108.4	110.3	120.3	10.0	1.9	10.0

PLAYWEAR
UNITS (mils)

	ANN 93	ANN!?	ANN 95	ANN 96	UNIT CHANGE 93/94	94/95	95/96
TOTAL	1,691.0	1,757.3	1,798.7	1,834.2	66.3	41.4	35.5
INFANT (I-2)	334.5	349.4	369.3	384.4	74.9	19.9	15.1
GIRLS (3-7)	273.6	279.2	330.4	312.6	5.6	51.2	-17.8
GIRLS (8-13)	294.0	308.1	307.6	310.2	14.1	-0.5	26
BOYS (3 7)	386.8	393.2	377.3	330.3	7.4	-15.9	21.0
BOYS (8-W)	403.2	427.4	414.1	428.0	24.2	-13.3	14.7

Source: NPD American Shoppers Panel 1/7/98

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

MEMORANDUM

DATE: April 23, 1998

TO : Margaret L. Neily, EX
Project Manager, Children's Sleepwear

Through: Warren J. Prunella, Associate Executive Director
for Economic Analysis WJP

FROM : Terrance R. Karels, EC TRK

SUBJECT: Economic Considerations of Revisions to the Children% Sleepwear Standard

The Directorate for Economic Analysis reviewed the small business and environmental effects of the subject proposal. Following are the preliminary findings of these reviews.

Effect of the proposed Rule on small entities

Pursuant to the Regulatory Flexibility Act (RFA), the Commission must publish a regulatory analysis of the proposed amendment's effect on small businesses and other small entities. Due to the nature of the revisions, they are unlikely to have any adverse impact on small business or other entities.

The revisions would change the location on the garments where the measurements are taken, to ensure the snug fit required in the 1997 exemptions. The upper arm dimension would be measured further down the arm, rather than at the armpit. Likewise, the thigh dimension would be measured further down the leg, rather than at the crotch. The seat measurement location is being clarified because a literal interpretation of current instructions could lead to an incorrect measurement. These changes are intended to result in a more comfortable garment, and make compliance to the dimensions of the exemption easier for manufacturers.

Garments which comply with the exemptions as measured at the armpit and crotch/seat would also comply after the proposed revisions. Some manufacturers, including small producers, may make minor product changes at a negligible cost. The proposal would have no significant adverse effects on costs or prices of children's sleepwear, or on the competitive position of small manufacturers.

The proposal is not likely to have a significant impact on a substantial number of small businesses or other small entities.

Tab C

UNITED STATES GOVERNMENT

Memorandum

U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207-0001

Date: MAR 0 9 1998

To: Margaret Neily, Program Manager, Office of Executive Director

Through: Alan H. Schoem, AHS Assistant Executive Director, Office of Compliance

From: Patricia Fairall, Program Manager - Ext. 1369 PAF

Subject: Industry Request for clarification of sleepwear segregation of tight-fitting garments

The Commission published in the Federal Register on September 9, 1996, a final amendment to the standards for the Flammability of Children's Sleepwear. The amendment exempted sleepwear garments sized 9 months and under and tight-fitting sleepwear garments in sizes above nine months.

After the amendments were issued in final form, CPSC compliance staff received a number of calls from firms asking if they could market the "tight-fitting" garments as sleepwear on the same rack as other children's sleepwear garments. The purpose of the amendment was to allow garments size nine months and under and tight-fitting garments in sizes above nine months to be sold and used as sleepwear. Therefore, the staff stated they could do so.

The definitions of children's sleepwear in the amended sleepwear standards, in 16 C.F.R. §§ 1615.1(a) and 1616.2(a) exclude infant garments (sized for a child nine months and under) and/or "tight-fitting" garments (as defined by the sizing charts). Since these items are excluded from the definition of children's sleepwear, industry was concerned about the policy statements in 16 C.F.R. §§ 1615.64 and 1616.65 which suggest segregation of items covered by the children's sleepwear standards from all fabrics and garments that are beyond the scope of the children's sleepwear standards.

Compliance staff recommends that the policy statements at 16 C.F.R. §§1615.64 and 1616.65 be clarified to provide that infant garments (sized for a child nine months and under) and "tight-fitting" garments (as specified in the amended sleepwear standards)can be marketed and promoted with other sleepwear.

Office of Compliance . 301-504-0400 . Fax 301-504-0359

Tab D

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

MEMORANDUM

DATE: **February 19, 1998**

TO : Margaret Neily, Project Manager, Children's Sleepwear, ES

Through: Dr. Robert B. Ochsman, Division Director, ESHF

FROM : Carolyn Meiers, Engineering Psychologist, ESHF

SUBJECT: Methodology for Structured Sleepwear Observations

The purpose of this memorandurn is to describe the methodology used for the structured observation of children's sleepwear.

BACKGROUND

Amendments to the children's sleepwear flammability standard (16 CFR Parts 1615 and 1616) went into effect January 1, 1997. These amendments exempt sleepwear sized for infants 9 months and under from the standard. They also exempt snug-fitting sleepwear, as defined in the amendments, in sizes above 9 months to size 14.

After the exemptions went into effect, CPSC received comments from industry questioning the feasibility of constructing wearable garments that conform to the requirements in the standard. Industry provided CPSC with a list of possible changes to the standard that would address their concerns about fit. Staff conducted structured observations of children's sleepwear to assess the level of practicality of some of these possible changes.

DISCUSSION OF METHODOLOGY

Purpose. The purpose of the structured observations was to determine the practicality of suggested changes to the children's flammability standard. For these observations, practicality was defined in terms of fit and utility. A practical garment was one that adhered to the intention of the regulation to provide a snug-fitting garment while permitting the wearer to move in the garment without undue discomfort or restraint. The observations also provided the staff an opportunity to evaluate, in a limited way, the effect of using a garment a size larger than the child's current size, and the effects of shrinkage.

Participants. The children chosen for the observations were recruited through a general announcement sent to CPSC staff. The CPSC staff who responded were instructed in standardized measurement procedures by Human Factors Division staff. The volunteers were given new tape measures and were asked to record the chest, waist, seat, upper arm, thigh, wrist and ankle measurements of their children (See Attachment A). These are the snug-fitting measurement points specified in the standards.

The flammability standards list snug-fitting dimensions for each size from size 9 months to size 14. The body dimensions of the children chosen for the observations were compared to the body dimensions in the standards. Those children whose body dimensions closely approximated the body dimensions for given sizes were selected to participate in the observations.

Six children were selected for the observations. The table below identifies the gender of the children, the age categories used for the observations, and the number of children selected for each category.

Age Category	Number of Children Per Category
Infant/Toddler (9 months-2 years)	1 boy
Preschool/First Grade (3-6 years)	3 (2 girls, 1 boy)
7-l 4 years	2 (1 girl, 1 boy)

Five children were observed, videotaped and photographed as they wore sleepwear garments. One child, who took part in the pilot, was not videotaped, but was observed and photographed. Attachment B lists the body dimensions of the children selected for the observations, the dimensions for the sizes in the standard that the children's body dimensions most nearly corresponded to, and the differences, if any, between the two sets of dimensions. In all but the first session with the six-year-old boy, the children's ages closely matched with the size of the garment, for example, a four-year-old fit a size 4.

Garments. The garments worn by the children during the observations were supplied by sleepwear manufacturers. They were constructed from interlock fabrics, 1x1 rib knit fabrics and a thermal knit. Some of the garments were prewashed, others were new. Children tried on a minimum of three different garments.[1] Attachment C is an example of the form used to list garment dimensions.

---

[1]For a detailed description of the garments refer to the March 21, 1998 memorandum from Margaret L. Neily, To The File, "Technical Amendments of the Children's Sleepwear Flammability Standards--Analysis of Snug-Fitting Requirements"

Evaluation Pane/. An evaluation panel of observers from CPSC staff, who are experts in garment design and textiles, made the determinations on the fit and utility of the garments. The criteria used for the evaluation were based on discussions with experts in the field of garment design from academia and industry.

Protocol. Parents signed a consent form and were present the entire time their child was observed. Attachment D is an example of the consent form, Each child was observed separately. An observational session lasted for approximately one and one-half to two hours. Observations were videotaped by two cameras to capture different perspectives of the children's movements.

Six observational sessions were conducted. The assessment process was refined . during the first two sessions. The first session was not videotaped because the objective was to establish and standardize procedures. Due to a failure of videotape equipment, only one view of the IO-year-old was taped.

Before an observation began, the child was given a few minutes to acclimate to the surroundings. Toys and games were supplied to capture the child's interest and to distract attention, as much as possible, from the taping. The intent was to have the child behave as naturally as possible under observational conditions.

After spending time getting acquainted with the room, toys, and staff, the child dressed in the sleepwear garment:, either with the help of the parent or alone. A private, screened area was provided as a changing room within the room where the taping was done. None of the children were videotaped while dressing. The evaluation panel was present in the changing room with the parent when the younger children were dressing to evaluate the ease in putting on or taking off the garment. Older children were not observed while dressing but they were asked for their observations about the ease of putting on and taking off the garment. In determining ease of dressing, the evaluation panel looked for indicators such as binding points and cuff tightness

For the taped observation, children were asked to perform a series of movements such as raising their hands above their head, touching their toes and turning somersaults. During these moverments, the evaluation panel looked for the following:

- Points of stress and binding on the garment,
- Whether the child tugged at or tried to adjust the garment,
- Any appearance of comfort/discomfort,
- If the garment "fit " (touching the body) as opposed to being "tight" (causing binding)

The evaluation panel also observed such things as'garment wrinkling and length. After observing the child in movement activities, a series of photographs were taken depicting the following still positions:

1. Standing, arms at side, FRONT VIEW
2. Standing, arms at side, BACK VIEW
3. Close-up of SEAT BACK
4. Close-up of sleeve with bent arm, FRONT VIEW
5. Arms raised to the side, TOP OF BODY ONLY
6. Arms raised all the way up, TOP OF BODY ONLY
7. Open stride with one foot on step, BOTTOM OF BODY ONLY
8. Open stride with both feet on floor, BOTTOM OF BODY ONLY

For the following "pretend sleeping" positions, the child would lie on a mattress as if to sleep:

9. Pretend sleeping on stomach'
10. Pretend sleeping on side, FRONT
11. Pretend sleeping on side, BACK
12. Pretend sleeping, close-up of BENT ELBOW
13. Pretend sleeping, close-up of BENT KNEE

Attachment E is an example of the form on which the panel's observations were recorded. The observation session for each garment ended after the photographs were taken. Children were given "snack breaks" between the observation sessions for the various garments. The protocol was repeated for each additional garment.

Parents were asked to take some of the garments home for the child to sleep in and provide feedback to the evaluation panel on the child's reactions to the garment. According to the feedback from parents, the children's reactions to wearing and sleeping in the garments at home varied with age. The younger children appeared not to be bothered by the snugness of the garments. The following remarks were made by the mother of the 4-year-old girl who took part in the observations.

> "She wanted to wear the pajamas and keep them. She was not uncomfortable or constricted in her movements. She put them on and took them off entirely by herself without any difficulty. She jumped, skipped, hopped and ran around in them."

The comments by the father of the 12-year-old girl indicate that these garments may not be as acceptable to older children.

> "She felt the two garments were uncomfortable to sleep in. She always wears loose fitting garments. The garments did not seem to bind or anything - she is just not used to sleeping in body hugging garments."

The 12-year-old girl was asked to come back for a second session so the evaluation panel could observe a garment top with an "hourglass" design. This garment was not available for the first session in which the girl participated. The evaluation panel decided that this design feature was not acceptable because the bottom of the pajama top tended to flare out and away from the body nullifying the snug-fitting safety factor of the garment.

Conclusions and Recommendations. A full discussion of the evaluation panel's findings is detailed in the March 21, 1998 memorandum by Margaret Neily, "Technical Amendments of the Children's Sleepwear Flammability Standards--Analysis of "Snug-fitting" Requirements. " Based on these findings, CPSC staff concluded that it is not feasible to construct practical garments according to the current measurement locations specified in the standards. Staff believes that by clarifying measurement locations for certain dimensions, practical, wearable garments can be made. The following table shows the measurement locations for the upper arm, seat, and thigh as currently given in the flammability standards and the staff recommendations for changing the measurement locations.

Where to Measure Garments to Determine Conformance to the! Flammability Standards		
Dimension	**Current Flammability Standards**	**Staff Recommendations**
Upper Arm	Measure at a line perpendicular to the sleeve, extending from the outer edge of the sleeve to the arm pit.	Measure at the midpoint between the shoulder and elbow. This recommendation has already been implemented. See the December 9, 1996 letter from the Office of Compliance to manufacturers, retailers and importers at Attachment F.
Seat	On one-piece garment, measure at the widest location between waist and crotch. On two-piece garment, take this measurement on lower piece only.	Measure 4 inches above the bottom of the crotch for all sizes.
Thigh	Measure at a line perpendicular to the leg, extending from the outer edge of the leg to the crotch.	Measure 1 inch down the inseam below the bottom of the crotch

Boy Age: 18 Months Size: 18-24 Months		Date: 12/9/97 Videos and Still Photographs	
	Child's Dimensions	Dimensions in Final Rule: Size 18-24 Months	Child's Dimension Minus Size Dimension
Chest	20	20½	-½
Waist	19%	20	-½
Seat	21½	21	+ ½
Upper Arm	6½	6⅛	+⅜
Thigh	11½	11⅝	-⅛
Wrist	4%	4%	+ ¼
Ankle	6⅛	5%	+ ¾

Girl Age: 4½ Size: 4		Date: 12/1/97 Videos and Still Photographs	
	Child's Dimensions	Dimensions in Final Rule: Size 4	Child's Dimension Minus Size Dimension
Chest	21%	22	-½
Waist	20%	21	-¼
Seat	22	23	-1
Upper Arm	7	6	+⅜
Thigh	13%	13	+ ¼
Wrist	5	4%	+ ¼
Ankle	5½	6%	-1%

Girl Age: 5 Size: 5		Date: 11 /8/97 Videos and Still Photographs	
	Child's Dimensions	Dimensions in Final Rule: Size 5	Child's Dimension Minus Size Dimension
Chest	22%	23	-½
Waist	20	21%	-½
Seat	23%	24	-¾
Upper Arm	7	6⅞	+⅛
Thigh	14	13%	+ ⅜
Wrist	4%	4⅞	-⅛
Ankle	6%	6⅝	+ ⅛

Please return to Carolyn Meiers, Human Factors 604-08

Parent's Name:		
Child's Name :		
Child's Age :		
Child's Usual Clothing Size:		
Note: Keep Tape Horizontal	Location	Dimensions
Chest	close! up under arms	
Bust	across bust fine	
Upper Arm - bent	midway between elbow and shoulder joint	
Wrist	above bone	
Waist	natural waist	
Seat	widest part	
Thigh	upper part of leg close to crotch	
Ankle	above bone	

Please circle the days of the week when your child can take part in the observations.

Mon Tues Wed Thurs Fri

What times during the day is your child available to take part in the observations?

am: pm:

Can your child take part in a whole day session (morning and afternoon)?

Can you bring your child to a two-day session (two partial days) ?

What days during October and November could you NOT bring your child in for the observations?

Boy Age: 6 Size: 4		Date: 1 0/22/97 Still Photographs Only	
	Child's Dimensions	Dimensions in Final Rule: Size 4	Child's Dimension Minus Size Dimension
Chest	23½	22	+1½
Waist	19⅞	21	-1⅛
Seat	22¼	23	-¾
Upper Arm	7⅛	6⅝	+½
Thigh	13	13	0
Wrist	4¾	4¾	0
Ankle	5¾	6¼	-½

Boy Age: 10 Size: 10		Date: 12/1 /97 Video (One view only) and Still Photographs	
	Child's Dimensions	Dimensions in Final Rule: Size 10	Child's Dimension Minus Size Dimension
Chest	28	28	0
Waist	25½	24½	+1
Seat	28	28	0
Upper Arm	8¼	8⅛	+⅛
Thigh	16½	16⅝	+⅜
Wrist	5½	5½	0
Ankle	8	7	+¼

Girl Age: 12 Size: 12		Date: 12/4/97 Videos and Still Photographs	
	Child's Dimensions	Dimensions in Final Rule:	Child's Dimension Minus Size Dimension
Chest	29¼	30	-¾
Waist	25½	25½	0
Seat	31½	32	-½
Upper Arm	8⅝	8½	-¼
Thigh	18	18½	-½
Wrist	5½	5¾	-¼
Ankle	7¾	8	-¼

Date: Child's Name: Age:	Garment Size: Description/fabric: Garment Mnfr:

	Child's Dimensions	Final Rule-Size ____	Difference-Child/Rule	Garment Dimensions
Chest				
Waist-pant				
Waist-top				
Seat				
Upper Arm				
Thigh				
Wrist				
Ankle				
Other garment dimensions for stability determinations				
Center front length--rib seam to hem				
Center back length--rib seam to hem				
Arm length--shoulder seam to cuff seam				
Pant length--top of waistband to cuff seam; side				

ATTACHMENT D

Informed Consent Notice for Sleepwear Project

Dear Parent/Aunt:

As you may know, the Consumer Product Safety Commission ("CPSC" or the "Commission") is responsible for issuing regulations concerning the flammability of children's sleepwear. Recently, the Commission issued regulations exempting certain tight-fitting sleepwear garments from these flammability regulations. The staff isconsidering whether to make some further changes to the regulations. In order to determine whether these changes are practicable, the staff is conducting the following program.

The program will involve the one-time observation of children between 9 months and 14 years of age at CPSC with the voluntary consent of their parent. The observers will be several CPSC staff members. During the program, and in the presence of a parent, the staff will ask the child to:

- Try on three to 5 sleepwear garments over their diapers or undergarments (parents will dress infants and toddlers).
- Perform some movements in each garment.
- Lie down on a mattress with each garment on.
- Answer some questions about each garment (parents will answer for infants and toddlers).
- Take two garments home to sleep in for one night each.
- Describe his/her impressions after sleeping in the garment (parents will respond for infants and toddlers).

Throughout the observation at CPSC, the children will be videotaped and photographed so that the staff may assess the fit of the garments. (Older children, ages 7 to 14, will not be videotaped or photographed while dressing and undressing.) It is estimated that the observation time will not exceed 5 hours.

By participating in the program parents agree to the use of the videotapes and photographs, without charge or restriction, by the CPSC. Also, the videotapes and photographs may be disclosed in response to requests under the Freedom of Information Act.

If you have any questions, please feel free to call me. We appreciate your participation in this program.

Sincerely,

CarolynMeiers
Name

Engineering Psvcholoaist
Title

301-504-0468 Ext. 1281
Telephone number

CONSENT FORM FOR CHILDREN'S SLEEPWEAR OBSERVATION

I have read the program description and I agree to allow my child to participate. I understand that I may withdraw my child's participation in this observation at any time.

Parent's Name _____

Parent's signature _____ Date_____

Child's Name _____

Child's Birthdate _____

ATTACHMENT E

CHILDREIVS SLEEPWEAR DEMO

Observations for garment--_____

Putting on and taking off: binding points, cuff tightness, other.

Observations during movement:
-pts. of stress/binding
-child adjusting garment
-appearance of comfort/discomfort
-"fit" rather than "tightness", touching rather than binding

"Fit" from a designers viewpoint: wrinkles, too long/short, etc.

Observations from still positions:

1. Standing, arms at side, FRONT
2. ", BACK
3. Close-up of SEAT BACK
4. Close-up of **SLEEVE WITH BENT ARM.**
5. Arms raised to the side, TOP OF BODY ONLY
6. Arms raised all the way up, **TOP OF BODY ONLY**
7. Open stride with one foot on step, BOTTOM OF BODY ONLY
8. Open stride with both feet on floor, BOTTOM OF BODY ONLY
9. Pretend sleeping on stomach
10. Pretend sleeping on side,, FRONT
11. ", **BACK**
12. Pretend sleeping, close-up of BENT ELBOW
13. ", close-up of **BENT KNEE**

U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

OFFICE OF COMPLIANCE

Assistant Executive Dinctor
Tel: 301-504-0621
Fax: 301-504-0008

December 9, 1996

Dear Manufacturer/Importer/Retailer:

This letter addresses two issues that have recently emanated after publication of the September 9, 1996, Children's Sleepwear Amendments: (1) Status of Children's Loungewear and (2) The method of measuring the Upper Arm Circumference.

Status of Loungewear

The children's sleepwear standards were developed to prevent children's sleepwear from igniting due to exposure to ignition sources such as matches/lighters, candles, ranges, stoves, space heaters, and fireplaces. Most of the incidents occurred while children were awake and wearing sleepwear or sleep-related items during the evening before bedtime or in the morning around breakfast time.

The Commission's regulations define the term "children's sleepwear" to include any product of wearing apparel [in sizes 0-14], such as nightgowns, pajamas, or similar or related items, such as robes, intended to be worn primarily for sleeping or -activities related to sleeping, except: (I) Diapers and underwear; (2) "Infant garments," sized for a child nine months of age or younger; and (3) "Tight-fitting garments" that meet specific maximum dimensions.

The CPSC staff views "loungewear" as garments worn primarily for sleep-related activities. Therefore, "loungewear" must comply with the children's sleepwear standards. The staff .intends.to take enforcement action against firms that market loungewear items that do not *comply* with the children'6 sleepwear standards (16 CFR 1615 and 1616).

The CPSC staff bases this position on the children's sleepwear standards and their background, the literature on the definition and trends regarding loungewear, a review of a number of catalogs to see what types of garments are being marketed as "loungewear," where in stores and catalogs "loungewear" is generally marketed, and discussions the issue With manufacturers and importers of children's sleepwear and underwear.,