PERVASIVENESS OF USE AND ADEQUACY OF CARE LABELS FOR PIECE GOOD FABRICS

by

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This study attempted to provide a basis for evaluating the effectiveness of the Care Labeling Rule in the piece goods market. There were two main objectives: (1) to determine if care labels are available and distributed with piece goods at the point of sale in the retail market; and (2) to determine if care labels supply adequate and accurate information.

To accomplish the first objective, 49 stores were selected in the Greensboro and Winston-Salem, North Carolina, and Washington, D. C. areas for the survey. These stores included a representative selection of department, discount and specialty stores selling piece goods. The researcher observed in each store to determine the types of fabrics consumers were purchasing and the availability of care labels.

Thirty-four samples of fabric representative of consumer purchases were secured for testing to determine if the care labels were adequate and accurate. All of the samples were designated to be refurbished under home laundry conditions. These were laundered as indicated by the care label or by standard household conditions in the absence of a label. The performance of fabrics was tested by modified standard procedures to determine color transfer, color loss, change in appearance, dimensional stability and loss of strength. These results were compared to minimum performance standards (MPS) established by the researcher.

The survey of 49 retail fabric distributors clearly showed that care labels were rarely dispensed with retail fabric purchases. The sales personnel of only one store were observed to automatically include care labels with each purchase. However, the sales personnel of an additional 29% of stores indicated that they voluntarily included labels with each purchase. Fifty-one percent of the stores had care labels available on request from the consumer. Care labels were not available at the remaining 18% of the stores.

The results of the performance tests on the 34 fabrics indicate that the available care instructions were frequently inadequate or inaccurate for proper maintenance. Seventy-four percent of the fabrics failed to meet one or more of the minimum performance standards by the 50th wash cycle. An additional nine percent would pass all of the MPS at the 20th wash cycle. The two main areas of failure were excessive shrinkage and loss of color.

A comparison of the labeled and unlabeled fabrics showed that a significantly higher number of labeled fabrics met the MPS for all variables. By the 50th wash level 100% of the unlabeled fabrics failed one or more of the MPS, while 39% of the labeled fabrics passed all of the MPS. Upon measurement at the 20th wash cycle, 56% of the labeled fabrics were not acceptable as compared with 91% of the unlabeled fabrics.

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CHAPTER I

INTRODUCTION

The average American family spends 6.6% of its annual disposable income on clothing (Clothing Expenditures Double, 1976). With this large expenditure, the consumer is interested in obtaining products that will meet expectations of performance. The consumer expects garments to maintain their appearance, size, color and finish throughout the refurbishing process and to be serviceable a reasonable length of time (Smith, 1966).

With the wide variety of products on the market, it is impossible for the consumer to know the performance properties of all textile items or the procedures for their safe refurbishing either from experience or prior knowledge (Fynn, 1969). To prevent consumer dissatisfaction due to products failing because of improper care techniques, the consumer needs proper instructions as to care procedures at the time of purchase.

The government's increased concern for quality and performance of consumer products resulted in the development and passage of the Permanent Care Labeling Rule on December 9, 1971, which became effective on July 3, 1971 (Federal Trade Commission, 1972). The Rule stated that all imported or domestically manufactured textile products that require maintenance care must have a permanent label with care instructions attached to the garment or that a care label be presented with each piece of fabric at the point of sale. Failure to follow the law would be construed as an unfair or deceptive method of competition.

The Federal Trade Commission (FTC) has shown continued concern with the effectiveness of the Rule and has expressed an interest in keeping pace with the needs of the consumer. To that end, the Commission solicited comments from consumers to be used in formulating changes to the rule in order to make it more responsive to consumers' needs.

These public comments showed there was one obvious area of failure in the original rule. Seventy-five percent of those responding indicated care labels were not being supplied to them by the retailer with piece goods purchased at the retail level (Federal Trade Commission, 1976, p. 3750). A group of clothing and textile graduate students at the University of North Carolina at Greensboro have also found this to be the case. In fact, sales people often were not aware of care labels being available for piece goods when they were requested.

Other general comments received by the FTC indicate that consumers were not always satisfied with care labels (Federal Trade Commission, 1976, p. 3750). Seventy-nine percent found care information on labels incomplete (i.e., washing instructions given without drying or ironing instructions). Also, 56% felt that the information given was inaccurate. John Lefevre (1972, p. 35) pointed out that when the Rule was passed, the Rule said nothing about accuracy.

Need for the Study

A review of literature indicates that little research has been done in the area of care labeling since the enactment of the Care Labeling Rule. What research has been done concerned itself with

various aspects of consumers' awareness, use, and understanding of permanent care labels. Only one researcher studied the problems of reliability of the care labels and she suggested further research be done using a wider range of fabrics (Mace, 1974).

Another shortcoming of the research in the area of care labeling is that for the most part it has been limited to the area of permanent care labels used in the ready-to-wear apparel market. Some attention needs to be given to the problems of care labeling for piece goods on the retail market. This is an important market due to the large volume of home sewing. The Council on Wage and Price Stability has reported that approximately 1.4 billion yards of piece goods are sold annually in the United States with a typical transaction between retailer and consumer involving three to four yards (Greenberger, 1976). Thus, there are some 250 million transactions annually. James Gordon of the Textile Distributors of America testified before the Federal Trade Commission hearings on the Care Labeling Rule that the over-the-counter piece goods market accounts for 2.3-3 billion dollars annually (Federal Trade Commission, 1977, p. 20). He also reported that there are 45 million, or roughly 20% of the entire population of the country, who are home sewers. It appears this may be an over estimate of a biased source, but nonetheless it does stress the importance of the piece goods market.

Statement of the Problem

The overall purpose of this study was to evaluate the effectiveness of the Permanent Care Labeling Rule as it is applied to the piece goods market. The specific objectives of the study were:

(1) To determine if care labels are available and distributed with piece goods at the point of sale in the retail market.

(2) To determine if care labels supply adequate and accurate information to maintain the performance characteristics of the piece goods through repeated home launderings.

Assumptions

The assumptions of this study are:

(1) Since there is a large volume of home sewing, care labels for piece goods are important.

(2) Consumers who sew need and may want care information as much as the consumer who buys ready-to-wear.

(3) All fabrics with no care labels or care instructions are machine washable.

(4) Unless otherwise labeled, all fabrics are bleachable without restrictions.

(5) Consumers are primarily interested in machine washable piece goods.

Limitations

(1) This study is limited to a representative selection of department and specialty stores selling piece goods in Greensboro and Winston-Salem, North Carolina, and Washington, D. C. areas.

(2) The study is limited to the selection of fabrics representative of what was purchased by consumers observed in this study. All fabrics are to be machine washable.

Definitions

Permanent Care Label-Label or tag which has been permanently attached to the garment that clearly discloses instructions for care.

In the area of piece goods, the consumer must be able to attach this label or tag to the finished article by normal household methods (Federal Trade Commission, 1972).

Piece Goods-Textile products sold on a piece-by-piece basis from bolts, pieces or rolls (Federal Trade Commission, 1972, p. 1).

Machine Wash-A process in which products or specimens can be washed, bleached, dried, and pressed by any customary commercial or home method (ASTM, 1972, p. 597).

CHAPTER II

REVIEW OF LITERATURE

At no time in history has the consumer had such a wide variety of textile products from which to choose. Historically the selection was limited to natural fibers, and information about the products was based on common knowledge or trial and error experiences. Due to rapid advances in the fiber and fabric industries, this is no longer the case. Surveys show that the consumer is no longer confident of being able to predict how a product will perform or how to care for it (Fortess, 1971).

Congress has passed laws in attempting to provide consumers with textile information. The Wool Products Labeling Act of 1939, the Fur Products Labeling Act of 1952, and the Textile Fiber Products Identification Act of 1960 all require that the consumer be provided with fiber identification ("Look for That Label", 1971). However, none of the legislation makes any attempt to provide information as to care techniques. This was questioned by representatives of the textile industry as early as 1958 ("Naming Textiles is Not Enough", 1959, p. 32). It has been pointed out that trade names and generic names are not particularly useful to the consumer unless they are accompanied by specific cleaning instructions ("Importance of Textile Labels", 1970).

Consumer research studies indicate that care instructions are the information most wanted by consumers (Smith, 1973). In view of this, manufacturers first included care facts on hang tags or labels

attached to garments. The hang tags proved to be an unsuccessful means of providing this information because they were removed and, therefore, not readily available to the consumer at the time care instructions were needed (Latour, 1972). Some voluntary attempts have been made to provide the consumer with permanent care information. In 1961 the National Retail Merchants Association proposed the Sure Care Symbols (Chaucer, 1972). The symbols were to indicate care procedures needed and were to be permanently attached to textile products. Another voluntary proposal came from the Industry Committee on Textile Information ("Voluntary Guide", 1967). Textile consumer goods were to be permanently labeled with appropriate care information where special handling was necessary to preserve the usefulness of the article or wherever it was not obvious how items could be successfully refurbished by conventional means. Neither of these proposals was widely accepted nor used by the industry ("At Last", 1972).

In examining consumers' textile complaints, Steinger and Dardis (1971) found the majority of faults with merchandise occurred during care procedures. Similarly, Fynn (1969) noted that one of the most frequent reasons for the return of unsatisfactory merchandise was damage resulting from washing or ironing by methods too severe for the fabrics. The consumer was not silent about these problems caused by lack of permanent care information. Kirkpatrick of the Federal Trade Commission reported that his department received 1,000 complaints a month on care labeling alone ("Message From the FTC", 1972).

The Federal Trade Commission Rule

In an effort to provide the consumer with the needed care information, the Federal Trade Commission promulgated the Permanent Care Labeling Rule on December 9, 1971, which became effective on July 3, 1972 (Federal Trade Commission, 1972). The Rule stipulated the following:

> 1. It is an unfair method of competition and unfair or deceptive act or practice to sell, in commerce, as commerce is defined in the Federal Trade Commission Act, any textile product in the form of a finished article of wearing apparel which does not have a label or tag permanently affixed or attached thereto by the person or organization that directed or controlled the manufacture of the finished article, which clearly discloses instructions for care and maintenance of such article (Federal Trade Commission, 1971, p. 1).
>
> 2. It is an unfair method of competition and an unfair or deceptive act or practice to sell, in commerce, as commerce is defined in the Federal Trade Commission Act, any textile product in the form of piece goods, made for the purpose of immediate conversion by the ultimate consumer into a finished article of wearing apparel, which is not accompanied by a label or tag which:
>
> (a) clearly discloses instructions for the care and maintenance of such goods and
> (b) is provided by the person or organization that directed or controlled the manufacture of such goods and
> (c) can by normal household methods be permanently affixed to the finished article by the ultimate consumer (Federal Trade Commission, 1972, p. 1).

According to the Rule the care instructions had to: (1) inform the purchaser of care procedures which "are necessary to the ordinary use and enjoyment of the article;" (2) warn the purchaser of any care procedures "which, in fact, if applied, would substantially diminish the ordinary use and enjoyment of such article;" (3) be "provided in such a manner that they will remain legible for the useful life of the article;" and (4) be "made readily accessible to the user" (Federal Trade Commission, 1972, pp. 2-3).

Articles which are sold at retail for three dollars or less and which are completely washable under all normal circumstances were exempt from the ruling. Other exemptions are those articles which utility or appearance would be impaired by the attachment of a permanent label. If such an exemption is granted the required care instruction has to accompany the article but does not have to be in permanent form (Federal Trade Commission, 1972, p. 1).

After the passage of the Care Labeling Rule, several groups attempted to help the textile and clothing industry to interpret the rule. The American Apparel Manufacturers Association (AAMA) and the National Retail Merchants Association (NRMA) developed labeling guides which include recommended procedures for implementing the Rule (Permanent Care Labeling, 1972, and Guide for Permanent Care Labeling, 1971). Similar attempts were made to educate the consumer about the Ruling through popular consumer magazines such as Consumer Bulletin, Good Housekeeping, and Redbook ("Now You Can", 1972; "How The New", 1972; Latour, 1972).

To review the Care Labeling Rule the Federal Trade Commission made a call for comments about the regulation (Federal Trade Commission, 1974). These comments and the subsequent hearings will be the basis for revision of the Care Labeling Rule. White (1976, p. 4) of the FTC noted that the concept of care labeling is now a "recognized, established, useful and widely accepted idea" that should be continued and is at a point where it should be improved for the efficiency of the use of care labeling and determining how care labeling can be done better.

The comments received by the Federal Trade Commission indicate that overall compliance with the rule has been good with 90% saying care

labels are available on apparel items and 85% commenting that the care labels are clear (Federal Trade Commission, 1976, p. 3750). Other comments indicated strong public support to extend care labeling. Eighty-five percent favored permanent care labeling being used on household furnishings, 95% favored extension of the Rule to cover leather and suede apparel, 76% favored the inclusion of yarn, and 70% favored increasing coverage to include intermediate components, which include such things as interfacings, zippers, and trims. Comments on the nature of care instructions indicated standardized terminology was favored by 79% while 93% advocated additional instructions or alternative methods when needed.

LeFevre (1976, p. 5) in reviewing the proposed changes for the Care Labeling Rule points out many of these comments have been incorporated in the revision. In addition to finished textile apparel items as covered under the original Rule, the new amendments also cover leather wearing apparel and household furnishings. In the area of piece goods, for which care labels must be supplied by the manufacturer for distribution by the retailer, care labeling for yarns may be added to the rule. A category of end products which may require care and maintenance information in non-label form (pamphlet, etc.) include carpets and rugs and intermediate components of finished products covered by the Care Labeling Rule. The new Rule attempts to provide more specific wording for the care methods including such things as washing, drying and ironing methods and temperatures and designations of appropriate bleaches or solvents when not all such products could be used. Alternative methods of

care must be stated if applicable and warnings that a maintenance procedure will damage must be given. The Commission also proposes adopting a glossary of terms relating to the care of textile products developed by the American Society for Testing and Materials (ASTM) under their standard D3136-72 (Federal Trade Commission, 1976). It is unclear in the proposed rule if these changes will affect the care labeling of piece goods.

Labeling of Piece Goods

The Textile Distributors of America (TDA) devised a plan for providing care labels for the consumer with fabric purchases known as the Triangle System for Labeling (Klapper, 1972). The system involves the use of nine separate care labels. Each label has a number enclosed in a triangle and care instructions which correspond with the code as shown in Table 1. This information is recorded on the end of bolts of fabric and the retailer is to supply the matching care label when fabrics are purchased. With this system the manufacturer has the option of supplying the retailer with care labels or giving appropriate care instructions while allowing credit for labels with the understanding that such labels will be distributed ("Triangle Care System", 1972).

The intent of the rule was to place care labels in the hands of the home sewers, but retailers have not been supplying the triangle care labels with the purchase of over-the-counter fabric (Powderly, 1976). Evidently, the 1/10-1/8 cent-a-yard discount given by the manufacturers has become a reduction in cost to the retailer (Klapper, 1976). Gray, the presiding officer in the FTC's Care Labeling Rule, suggests a system needs to be established where the retailer would be

Table 1

Triangle System of Labeling

for Piece Goods

CODE	WORDING
Method 1	Machine wash, warm
Method 2	Machine wash, warm: line dry
Method 3	Machine wash, warm: tumble dry, remove promptly
Method 4	Machine wash, warm; delicate cycle: tumble dry, low; use cool iron
Method 5	Machine wash, warm: do not dry clean
Method 6	Hand wash separately; use cool iron
Method 7	Dry Clean Only
Method 8	Dry Clean; pile fabric method only
Method 9	Wipe with damp cloth only

Note. These coded labels were developed by the Textile Distributors Association for use with over-the-counter fabrics (Lyle, 1977).

responsible for passing the care information they receive from the manufacturer on to the customer (Greenberger, 1977).

Review of Previous Research

Research in the area of care labeling since the passage of the Care Labeling Rule has been extremely limited. The major considerations seem to have been in the areas of awareness, use and interpretations of the labels and reactions to the Ruling. The author was unable to find any studies related to the availability of care labels for piece goods and only one limited study on the reliability of care labels for piece goods.

Ambry (1972) was among the first to investigate care labeling after the enactment of the Care Labeling Rule in 1972. She interviewed 292 customers in sportswear and dress departments to determine their awareness of permanent care labeling of textile products. The results showed that the majority of consumers were not aware of permanent care labels. In fact, only one person reported any knowledge of the FTC ruling and only 24 frequently noticed permanent care labels. She also investigated preferences for label type, content and placement. It was determined that there was strong support for the word system used by the Federal Trade Commission vs. the European System of Symbols. The respondents also consistently preferred the most readily accessible area of the garment for label placement. These findings did not significantly relate to age, income or education. However, preferences for the full instructions of permanent care label over information previously given on hang tags increased with education.

At the same time, Honchul (1972) was investigating a similar problem. Three-hundred respondents were given a questionnaire in three retail stores to determine the relationship of sex, age and educational level on the use by consumers of care labels in clothing and preferences of consumers for the types and locations of care labels in clothing. Sex was found to be a significant factor as to the use of care labels in purchase decisions and when cleaning garments for the first time. Although sex was found to be a factor, the overall preferred location of labels was the back of the neck in shirts, and the waist of pants or skirts. Educational level related positively to the use of care labels and the type of care labels preferred as in Ambry's (1972) study. No significant relationship was shown between age and

the use of care labels, the types of care labels preferred, and the location of these labels on the garments. The consumers in the study were aware of the permanent care labels. Approximately 60% always observed care labels when purchasing garments and 73% indicated they look for the labels when cleaning the garment for the first time. An additional 10.4% stated they would not purchase a garment unless accompanied by a label. These results were inconsistent with the results of Ambry's study (1972).

In 1973 Skaggs completed another study on consumers' awareness and use of permanent care label information in the selection of garments. One hundred and ninety women who just purchased were asked to respond to the awareness and use in selection measure developed by the researcher. One fourth of the respondents were not aware of permanent care labeling and approximately one-half indicated so little awareness of permanent care labeling information that they were not questioned as to use in the selection. Eighty-four percent of those questioned reported they made some use of the information found on permanent care labels in making garment selection. As in other studies (Ambry, 1972; Honchul, 1972), there was a significant relationship between awareness of permanent care labels and consumers' educational level. Awareness was not, however, associated with the customers' age or experience in clothing construction.

A consumer survey was conducted by Arbaugh in 1974 to investigate the usage of care label information in the selection and care of textile products. Information was received from the respondents in personal interviews at the time of purchase, a follow-up mail questionnaire, and telephone interviews of those who responded to the

questionnaire. Of the 770 in-store respondents, 30.9% used care label information in selecting the garment. It was found that those "users" of label information did not have a significantly higher level of education and a better knowledge of textiles than the "non-users." Responses to the questionnaires and telephone interviews also indicated that the consumers with more textile knowledge referred to care labels during the refurbishing process. Almost 50% of the 402 responding to the questionnaire indicated use of labels during care. Arbaugh also tried to profile group membership (user or non-user) by consumer characteristics by applying discriminate analysis using numerous factors. The analysis showed the groups were too similar to provide any significant differences. Arbaugh did find that one-fourth of her telephone respondents were not aware of the permanent care rule and on the whole consumer knowledge of care label information was found to be deficient.

Huffman (1974) studied interpretations and applications of permanent care labels. Her objectives were to determine the extent consumers were influenced by permanent care labels when purchasing and caring for ready-to-wear garments and to investigate relationships between the variables of educational level, total family income, laundry experience, label presence, and a homemaker's ability to make correct garment care decisions. Data were collected by means of a questionnaire from 181 women. Sixty-five percent of the respondents knew permanent care labels were required on ready-to-wear garments. A permanent care label always influenced purchase decisions of 54%. Over 87% of the respondents said they always looked for the care label

before laundering a garment for the first time, but a much smaller percentage said they actually followed the label instructions. All the variables were positively related to the consumer's ability to make correct garment care decisions. Educational level and presence of a label were the most significant of the variables.

To gain further understanding about consumers' use of care labels, Critz (1975) interviewed 422 persons. Attempts were made to determine if relationships existed between consumers' use of permanently attached care instructions and (1) demographic information, and (2) laundry practices and reactions to the care labeling program. Of the demographic variables investigated, only family size was correlated (positively) to use of permanently attached care instructions. The determination of relationships between laundry practices and use of permanently attached care instructions showed three areas: number of wash loads done per week, degree of adherence to directions provided by equipment manufacturers and/or detergent packages, and amount of special attention given to stains. The researcher also concluded that consumers' desire for care labels, satisfaction with care labels found, finding of care labels in garments, and opinions of durability of the care labels were all significantly related to use of permanently attached care instructions.

Gahring (1975) examined consumers' interpretations and applications of information on selected permanent care labels. Data were collected by 25 personal interviews. Results showed that laundry facilities available, fabric characteristics, fiber content and previous experience and assumptions about care procedures influenced interpretations of care labels. Specific findings showed that

respondents (1) did not have appropriate equipment allowing them to follow instructions on such care labels; (2) related care procedures on care labels primarily to shrinkage, wrinkling, color and end use; (3) based care decisions on understanding of the characteristics of fiber contents; and (4) stated preferences for laundry procedures despite what care labels stated. In analyzing the data collected, the researcher made note that the respondents showed a limited understanding of label terminology and textile knowledge.

Dignes (1975) examined the consumer response to care labels for piece goods. Seventy questionnaires from women on the Rhode Island Cooperative Extension Service mailing list were analyzed to determine knowledge of the permanent care rule attitudes and use of permanent care labels when selecting fabrics and when refurbishing garments made from the fabrics. The mean of the knowledge scores was 8.74 out of a possible 14 points. Eighty-seven percent of the respondents were in moderate agreement with the rule and felt they have the right to care information for the variety of fabrics on the market; 53.4% scored high on use of labels in purchasing. This suggested that consumers noted care labels in purchasing fabrics, but they do not use them regularly as part of the decision-making process. In refurbishing garments, 90% of the respondents relied on permanent care labeling. This percentage may be misleading in that the questionnaire was worded so that the answers could be simply an interpretation of care procedures.

Research conducted by Saltford, Daly and Rushman (1978) assessed consumers' understanding of apparel care labeling terms in order to determine consumer reactions to care labeling. Respondents (381) completed self-administered questionnaires. Results showed that most

respondents interpreted care instructions literally while these literal interpretations may not correspond to the standard ASTM definitions. Education, age, income or place of residence were not found to have a significant relationship to interpretations as in some studies (Huffman, 1974; Gahring, 1975). Consumer reaction to care labeling seems to be positive. Ninety percent of the respondents felt they had the right to permanently attached care labels that were clear and reliable. Eighty-three percent viewed the care label as an implied warranty, in that if the product failed during specified care procedures the manufacturer should be responsible. Ninety-five percent of the consumers felt the need for labels to have more complete instructions (i.e., drying, ironing, bleaching directions) and also believed labels should be uniform among manufacturers.

Consumers' understanding of terms used on care labels was also the subject under investigation by Kincaid and Hatch (1978). They developed a questionnaire to determine consumer understanding of care procedures based on ten specific care terms and administered it to 177 women. Conclusions show that the consumers' perception of these terms differ from the standard definitions of the ASTM. The term, Do Not Use Chlorine Bleach, was the only term interpreted the same as defined. The researchers pointed out that if lower levels of care would have been designated as acceptable alternatives (e.g. the definition of hot water did not include warm or cold water as alternative procedures) there would have been greater understanding of terms on the part of the respondents. Respondents often viewed lower temperatures in washing and drying as acceptable alternatives to that stated on the label.

Unlike other studies dealing with care labeling, Mace (1974) studied the reliability of permanent care labels for selected piece goods. The four fabrics tested were similar acetate nylon warp knits which were accompanied by Method (3) and Method (4). The reliability of the labels was determined by assessing dimensional change, wrinkling and color change after five launderings. Only one fabric met minimum performance requirements used in the study; the other fabrics showed considerable change in performance characteristics. On this basis, the two care labels accompanying the fabric were deemed unreliable for these fabrics. The researcher suggested other work should be done on the reliability of care labels for other fibers and fabrics.

From this review of previous research, it appears that the attempts to assess the consumer awareness and use of label information in selection and care of textile items given have shown varying and conflicting results. Possible reasons for such differences may include (1) the studies were conducted at different points in time, (2) the researchers' definitions of usage may not have been identical, (3) different methods of data collection were used, and (4) sampling techniques. The lack of awareness of consumers in the research also conflicts with the reports of success received by the Federal Trade Commission. This might be expected as research showed those with more education and textile knowledge did prefer permanent care labeling. It would be these people who would take the time to write comments to the FTC. Those commenting on nature of care instructions do support the research findings that the consumer does not always use or understand the label terminology.

The Permanent Care Rule has in one way served to protect the consumer who does not even follow care instructions. It has discouraged the marketing of those products that could not be successfully refurbished by any method (e.g. garment with fabric which has to be dry cleaned with trim that cannot withstand the solvents) (Stravrakas, 1972). The rule has been viewed as an implied warranty that, when the consumer has followed the care instructions, the product will perform satisfactorily (Joseph, 1977). There appears to be a concensus that for care labeling to function to its fullest capabilities, the consumer must be educated to be aware of the labels and the value of the information.

CHAPTER III

METHODOLOGY

The purpose of this study is two-fold. One objective is to determine if care labels are available and distributed with purchases of piece goods at the retail level. The second objective is to determine if the available care labels provide adequate and accurate information for maintaining the appearance of the fabric throughout the refurbishing process. The methods and materials used in this study are discussed in this Chapter under the following headings:

Selection and Survey of Retail Fabric Distributors

Selection and Preparation of Fabrics

Laundering Conditions

Performance Tests

Treatment of Data

Selection and Survey of Retail Fabric Distributors

To determine if care labels are available and distributed at the retail level, it was necessary to go into the market place and do personal observations. The sampling of stores was limited to Greensboro and Winston-Salem, North Carolina, and to Washington, D. C., including the surrounding suburbs, as examples of medium size industrial cities and a large cosmopolitan city.

Selection of Stores. Stores which were listed in the Yellow Pages under the classification of fabric or department stores were called to verify that fabrics suitable for conversion into apparel were available.

In the Greensboro and Winston-Salem areas it was possible to survey all the stores selling fabric. To assure a mixture of store types and locations in the Washington, D. C. area, stores were classified on the following basis: (1) listing of the store as a fabric or department store, and (2) location of the store as a district store or suburban store. Seventeen stores were picked at random with the aid of a random numbers' table from the resulting lists (See Appendix A).

Survey of Fabric Retailers. Before any observations were done in a store, the manager or another person in charge was contacted. The researcher would identify herself and explain that she was doing a research project related with piece good sales. She would request permission to observe in the store and to record observations including information from the end of the bolts of the fabrics being purchased.

The researcher would stay in each store for forty-five minutes to an hour. During that time she observed and recorded what fabrics were being purchased by the consumer and if care labels were presented with the purchases. Notes would be taken from the information on the end of the bolt as to manufacturer, fiber content, care procedures, and any other pertinent information.

As the end of the observation period approached, the researcher would ask the sales people about care labeling. The subject was approached in a conversational manner with a phrase like, "I've noticed many of the bolts indicate care procedures." Then three questions would be asked: (1) Are there care labels available? (2) If so, did they distribute them with each purchase? and (3) Did consumers request them? These answers were recorded along with the information from the rest of the observation period.

Selection and Preparation of Fabrics

To determine if care labels provide adequate and accurate information, fabrics were purchased and checked for performance after the refurbishing process.

Selection of Fabrics. One-half yard of 34 fabrics were obtained from a wide variety of stores included in the survey (see Appendix B). The piece goods had varying care instructions. Some of the fabrics had no care instructions, and the others could be classified into the care methods (1) through (5) of the triangle coding system. The fabrics selected were representative of what was purchased by the consumers observed in this study. A care label was requested for each fabric if one was not voluntarily given.

Preparation of the Fabrics. Two samples were cut from each fabric. These measured 12 inches in the warp direction and 18 inches in the filling direction. The remaining fabric was reserved as the control. All of the pieces were marked with an indelible laundry pen indicating the warp direction and coded with fabric number and care method number. One sample of each fabric which was to be bleached also carried that notation. (Only the wool and wool blend fabrics were not bleached based on "common sense".) These markings were on both warp edges of the fabric. The fabrics which were to be subjected to laundering received additional preparations. All of the edges of the fabric were over-edge stitched to prevent raveling. A ten-inch dimensional stability square was marked at one end with a one-inch margin from all edges of the sample. After each fabric had undergone five launderings, six inches were removed from the one end and reserved for testing. The sample was re-edge stitched.

Laundering Conditions

To follow given care instructions for the samples, it was necessary to modify the machine washing and drying conditions in American Association of Textile Chemists and Colorists (AATCC) Test Method 124-1975 (AATCC, 1976, pp. 181-182) as summarized in Table 2. Washing conditions were within the ASTM D3136-2 definitions of terms related to care (ASTM, 1976, p. 597).

Table 2

Summary of Machine Washing and Drying Conditions

Washing Conditions:	Sears Kenmore Heavy Duty Washer, Full Water Level 90 Grams Tide Detergent, 4 lb. Load			
I	Machine Wash	Warm Water 90°-110°	8 Minutes	Delicate Cycle
II	Machine Wash	Warm Water 90°-110°	12 Minutes	Regular Cycle
III	Machine Wash	Hot Water 130°-150°	12 Minutes	Regular Cycle
Drying Conditions:	Sears Kenmore Heavy Duty Dryer			
A.	Line Dried			
B.	Tumble Dried	Delicate Setting		
C.	Tumble Dried	Normal Setting		

The test specimens were divided into wash loads appropriate to the care instructions. Dummy pieces were added to make each a four-pound load. Fabrics classified ④ were laundered using Condition I, and those classified ① , ② , ③ , and ⑤ were laundered using

Condition II. Fabrics without care instructions were laundered under Condition III which is considered to be the most vigorous household condition by AATCC.

The samples coded for bleaching were subjected to the same conditions as the other fabrics. However, they were also subjected to chlorine bleach (Sodium Hypochlorite) in the first five wash cycles. One cup of bleach was added to the wash cycle as the recommended amount by the manufacturer. After each wash cycle fabrics were removed immediately and dried under the appropriate procedure. Method 2 fabrics were line dried and Method 4 fabrics were tumble dried on the delicate setting. Fabrics of the Methods 1 , 3 , and 5 were subjected to drying Condition C. All fabrics were removed promptly at the end of the drying cycle.

Performance Tests

The performance of the fabrics was assessed by executing tests at various intervals. All evaluations were done after the fabric had reached equilibrium (at least 12 hours) in standard conditions of 70° F ± 2° and 65% RH ± 22%. Subjective testing was done by a panel of three graduate students in Clothing and Textiles at the School of Home Economics at The University of North Carolina at Greensboro.

Color Transference. This test is an adaptation of the AATCC Test Method 133-1976 Color fastness to heat: hot pressing (AATCC, 1976, 130). Specifically, specimens were pressed with a hand iron between two pieces of multifiber test fabric for 15 seconds. The iron was on the temperature setting appropriate for each fabric. The test was performed wet and dry on the original fabric and after five launderings.

The actual color transference was judged by a three-member panel using the AATCC Chromatic Transference Scale as is described in AATCC Evaluation Procedure 3 (AATCC, 1976, 106). The judges would select the rating which most closely matched the amount of staining on the multicomponent cloth.

Color Change. The three members of the panel evaluated color change of the fabrics using the AATCC Gray Scale for Color Change. This was done with each person independently rating the samples following the AATCC Evaluation Procedure 1 (AATCC, 1976, 103). The samples were rated after one, five, twenty and fifty launderings.

Appearance. The AATCC Test Method 124-1975 (AATCC, 1976, 181-182) was modified for judging the appearance of fabrics after laundering as follows:

(1) The laundry conditions were changed to meet the care label specifications as was mentioned previously.

(2) Due to the limited amount of fabric available the appearance square was reduced to a 12-inch square.

The panel members evaluated the specimens, independently assigning the number of the three-dimensional replica which most closely matched the sample. Monsanto Three-Dimensional Wash and Wear Standards were used in place of the AATCC Three-Dimensional Durable Press Replicas. Observations were made after one, five, twenty and fifty launderings.

Dimensional Stability. Dimensional changes in the fabrics were determined using a modification of AATCC Test Method 135-1972. The 10-inch dimensional stability square was marked on the same specimen used for appearance test. Three measurements parallel to the length of the fabric and three parallel to the width of the fabric were measured to

the nearest 100th of an inch. Dimensional change was calculated using the following formula after one, five, twenty and fifty launderings.

$$\text{Percent Dimensional Change} = \frac{\text{Percent Original Length} - \text{Final Length}}{\text{Original Length}} \times 100$$

Fabric Strength. Fabric strength of woven fabrics was determined using ANSI/ASTM D1682-64 (Reapproved 1975) Standard Test Methods for Breaking Load and Elongation of Textiles. Three warp samples and three filling samples were broken using the raveled strip method on the Scott Tester. Each fabric was tested in the original state, after five and fifty launderings.

Bursting strength of the knit samples was determined on the Mullen Tester. Three specimens of each sample were tested under conditions outlined in the ANSI/ASTM D231-62 (Reapproved 1975) Standard Methods of Testing and Tolerances for Knit Goods (ASTM, 1976, 62-63). Measurements were made on the control fabrics and after five and fifty launderings.

Treatment of Data

Performance Standards. The results of the five performance tests on each fabric were compared to minimum requirements established by the researcher. These requirements were suggested by the U.S.A. Standard Performance Requirements for Textile Fabrics (NRMA, 1968) and industry standards. The minimum requirements for each test are as follows.

Color Transference - Class 4 on AATCC Chromatic Transference Scale

Color Change - Class 4 on AATCC Gray Scale for Color Change

Appearance - Fabric smoothness rating of 3 on Monsanto Three Dimensional Wash and Wear Standards

Dimensional Stability - Maximum change in each direction of 2.5% for woven fabrics, 5% for knit fabrics

Fabric Strength - 2/3 of original fabric strength

Statistical Analysis. Analysis of variance was conducted on the tensile strength and dimensional stability data for each fabric to determine if significant differences existed. The model included the effect of bleach, the effect of number of washings, and the interaction of bleach with wash number. Analysis of variance was also used to determine the effects of bleaching on appearance and color change with the model consisting of the effect of bleach. Scheffe's post-hoc tests were used to examine which pairs of means differed significantly. The .05 level of significance was chosen for these variables. For the subjective variables of color transference, color change and appearance, the standard deviation among judges examining the same piece of fabric was computed. This was averaged across all judging to give the average standard deviation among judges which was used as a standard that was indicative of how much variability might result from random fluctuations in judgment. Differences in the subjective performance tests due to wash number were determined to be statistically significant if they were larger than three times the standard for that variable. Analysis of variance was also performed to determine if labeled fabrics were significantly better as to the performance characteristics studied than those fabrics which were unlabeled. The model for color transference consisted of the effect of label instruction; for color change and

appearance the model included effect of bleach, effect of label instructions and interaction between bleach and labeling. For tensile strength and dimensional stability the model included effect of bleach, effect of number of washings, effect of label instructions and interactions of bleaching with wash number, labeling with bleaching, labeling with wash numbers and labeling with bleaching with wash number.

CHAPTER 4

RESULTS

Availability of Care Labels

The survey of 49 retail fabric distributors clearly showed that care labels were rarely dispensed with retail piece good purchases. The personnel of 15 stores indicated that care labels were included voluntarily with each purchase. However, this was not found to be the actual practice during the observation period; only one store automatically included the care label with each purchase. An additional 25 stores did have care labels available on request by the consumer. Nine stores did not have care labels available even if requested.

No clear differences could be noted by classification as to location of the store or type of store in whether or not care labels were available. The Tables 3 and 4 give a break down on availability of care labels by classifications. The one store that did voluntarily distribute care labels was a Winston-Salem discount store.

The majority of personnel in the fabric stores or departments did not indicate any knowledge of the care labeling rule. Representatives of four stores, 8%, did mention there was a law requiring care labels for piece goods when discussing the distribution policy for care labels. There was agreement among those interviewed that consumers rarely requested care labels. Home Economics students and professional dressmakers were the only ones identified as requesting the labels.

Table 3

Availability of Care Labels

as to Store Type

	Indicated Voluntary Distribution of Labels [a]	Labels Distributed on Customer's Request	No Care Labels Available
Fabric Store	7	11	4
Department Store	6	8	4
Discount Store	2	6	1
Total	15	25	9

[a] Only one store actually observed giving care labels.

Table 4

Availability of Care Labels

as to Store Location

	Indicated Voluntary Distribution of Labels [a]	Labels Distributed on Customer's Request	No Care Labels Available
Greensboro, North Carolina	4	10	4
Winston-Salem, North Carolina	5	6	4
Washington, D. C.	6	9	1
Total	15	25	9

[a] Only one store actually observed giving care labels.

When observing in the stores the researcher became aware that not all fabric bolts were labeled with care instructions or triangle system of coding. The problem was not isolated as it occurred in all store types and locations. The problem did seem to be more prevalent in fabric stores that were part of a chain due to the practice of rerolling fabric onto different bolts. Since this was not a planned part of the study, no formal data were gathered.

Adequacy of Care Labels

Each fabric was analyzed in relation to five tests of performance at various wash levels. (In this chapter, terms such as washings, launderings, wash cycles, wash levels and wash numbers are used interchangeably. The terms indicate a complete washing and drying cycle.) The resulting means for each test are reported in Tables 5 through 12 in Appendix C.

The analysis of variance results are also in the Appendix D in Tables 13 through 19. The text discusses the significant differences between means that occurred. The numbers in parentheses indicate the actual difference. The units used were those commonly accepted by AATCC for each performance test. Difference in color transference, color change and appearance are noted as differences of the assigned ratings. The tensile strength differences are in pounds, and the dimensional stability differences are recorded in percentage change. The results of each performance test were compared to the minimum performance standards (MPS) defined in Chapter 3.

Fabric 1. Fabric 1 showed no significant color transference or color change at any point in the test period. The minimum performance standards (MPS) for these variables were surpassed.

The appearance data for Fabric 1 showed a significant deterioration from the original fabric at wash number 1 and 50 (1.35, 1.35). At no point did the fabric fail the MPS of appearance. There was an unexplained significant improvement between wash numbers 1 and 5, and 1 and 20 (.5, .35).

The dimensional stability of Fabric 1 showed significant shrinkage in the warp direction after the first laundering. Further significant shrinkage was noted between wash numbers 1 and 5 and 5 and 50 (1.43, 2.47). At the fifth wash cycle the warp direction failed to meet the MPS. The filling also showed significant shrinkage after the wash (1.52), but a significant amount of stretch was noted between the fifth and 50th launderings. The filling met the minimum performance standards for dimensional stability.

The data for tensile strength showed that Fabric 1 had significant losses in both the warp and filling by the fifth washing (3.3, 2.66). No further significant losses were noted in either direction. The filling of the bleached sample did show significantly more strength loss than the unbleached specimen. The strength loss was never greater than that allowed by the MPS.

Fabric 2. The color transference data for Fabric 2 showed no significant dry color transference. The original fabric, however, transferred a significant amount of color (.5). After five washings no wet color transference was noted. The fabric met MPS for color transference.

Color change of Fabric 2 was significant at 50 launderings on the bleached sample (1.33). Bleaching was found to cause a significant

difference in loss of color (.83). The bleached sample showed significant loss of color by five launderings (1) while the unbleached sample did not. The bleached fabric failed to meet the MPS for color change by 20 launderings while the unbleached sample did meet the MPS.

There was fluctuation in the appearance performance of Fabric 2. The fabric surpassed the MPS in regard to appearance, but there was a significant drop between the original fabric and that which had been laundered 1, 5 and 50 times (1.34, 1.05, 1.27). After the first laundering the appearance did improve. Bleach was not significant in relation to appearance.

Fabric 2 showed a significant amount of shrinkage in both the warp and fill directions between the first and fifth washings (.5, .42) and between the 5th and 50th washings (1.22, .48). The unbleached warp shrank significantly more than the bleached warp (.4). The unbleached warp failed to meet the MPS at wash level 20 while the bleached warp did not fail until wash level 50. The bleached sample filling showed significantly more shrinkage than the unbleached (.24). Both specimens failed to meet the MPS in the filling by the first laundering.

The tensile strength of Fabric 2 showed no significant difference after repeated launderings in either the warp or filling. The bleached filling sample did lose more strength than the unbleached sample (3). The MPS were maintained in both the warp and filling.

Fabric 3. A significant amount of wet color transference was noted on the unwashed Fabric 3 (.34). After laundering there was no significant transference. There was no dry color transference.

The appearance and color of Fabric 3 did not change through the repeated launderings. Significant shrinkage was noted in the warp

between 0 and 50 washes (.6); the shrinkage had occurred by the fifth wash (.53), but there was no further significant change in the successive washes. There was no change in the filling direction.

The filling did not show any significant change in tensile strength. The warp did show a significant loss between 5 and 50 launderings (4.33).

Fabric 3 was not treated with bleach so no comparisons could be made to determine the effects of bleach.

Fabric 3 surpassed the MPS on all variables studied.

Fabric 4. Fabric 4 did not exhibit any dry color transference. There was a significant amount of wet color transference on the original fabric (.5) but not by five washings.

There was no change in the appearance, color or dimensional stability in the filling of Fabric 4. The warp did show significant shrinkage between 1 and 5 washes (.63); however, the fabric did stretch between 5 and 50 washes (.47) so that the comparison of 1 and 50 washes was not significant.

The warp and filling tensile strength showed no significant changes during the repeated launderings.

Fabric 4 was not bleached so there were no comparisons showing the effect of bleach.

Fabric 4 met all MPS for this study.

Fabric 5. Fabric 5 showed significant wet color transference on the original fabric (.5) and at five washes (.34). There was no significant difference between the laundered and unlaundered fabric. There was no dry color transference. Both color transference measurements were within the MPS.

There was a significant loss in color on Fabric 5 (1.4). No difference was detected in color by 20 washings, but there was a significant loss at the 50th wash (1.4). It failed to meet the MPS.

The appearance ratings of Fabric 5 did show significant differences between the original and that which had been laundered 1, 5, and 20 times (1, 1, .33). There was significant improvement in the appearance by the fifth wash (.67) and by the 50th the fabric showed no change from the original. At no point did the fabric fail to meet the MPS.

The dimensional change of Fabric 5 was significant after it had been laundered. The warp failed to meet the MPS at the first wash (3.68) and no significant change was shown through the repeated launderings. The filling did meet the MPS, but significant shrinkage was noted between the first and fifth launderings (.43).

There was no significant change in either the warp or the filling in tensile strength of Fabric 5.

Fabric 5 was not bleached so no comparisons could be made between bleached and unbleached samples.

Fabric 6. The MPS for color transference and appearance were exceeded by Fabric 6. There was no significant change in either of the variables.

Both the bleached and unbleached samples of Fabric 6 showed significant color loss (3.17, 3.17). The bleached sample showed significant loss at the first wash (.5) while the unbleached sample retained the original color. The color loss of both samples was progressive. The bleached sample failed to meet the MPS for color change by five washes while the unbleached sample failed by 20. There were no significant differences between bleached and unbleached after 50 launderings.

The dimensional change of Fabric 6 was significant in both the warp and filling. The warp direction showed significant shrinkage between the first and fifth wash (1.04) with no significant change in successive washes. The warp met the MPS. The filling showed significant shrinkage between the first and fifth (1.85) laundering and also between the 5th and 50th (4.2). The bleached samples shrank significantly more than the unbleached (1.03). Both samples of Fabric 6 failed to meet the MPS for dimensional stability in the filling by 50 washes.

The bursting strength of Fabric 6 was significantly affected by number of washes (3.34), but differences could not be detected between 0 and 5 or between 5 and 50 washes. The fabric did meet the MPS.

Fabric 7. Fabric 7 met the MPS on color transference, color change and appearance. There was no change noted on the fabric within these variables.

There were significant differences in the warp and filling dimensional stability on Fabric 7 (3.47, 1.13). The warp showed significant shrinkage between the first and fifth launderings (1.41) with additional significant shrinkage occurring between the 5th and 50th launderings (1.74). The filling showed significant shrinkage at the 50th laundering (1.13). The difference was noted as occurring after the fifth laundering (.93). There was an interaction with the wash number and whether or not the fabric was bleached. The unbleached samples showed significantly more shrinkage at 50 launderings (.8). The warp and filling met the MPS at all levels for dimensional stability.

The tensile data showed a significant loss in bursting strength at 50 wash cycles (6). The difference was not significant at five launderings so the significant loss occurred between wash 5 and wash 50 (5.17). Fabric 7 maintained the required strength to meet the MPS.

Fabric 8. Fabric 8 exhibited no color transference nor change in appearance or color. The fabric surpassed the MPS for these variables.

The warp and filling of Fabric 8 did show significant change in dimension at 50 launderings (2.9, 2.68). The warp of the fabric showed significant loss by the fifth washing (1.3) and additional significant loss in subsequent washes (1.6). The unbleached sample showed significantly more shrinkage than the bleached sample (.39). The filling did not show significant shrinkage by the fifth laundering but the following wash cycles did cause significant shrinkage by the 50th cycle (2.68). The warp and filling shrinkage was not in excess of the MPS.

Fabric 8 lost a significant amount of strength by five washings (6.67), and between 5 and 50 washings (9.67). The bleached sample was significantly stronger than the unbleached sample (1.56). At no time did Fabric 8 fail to meet the MPS related to strength.

Fabric 9. There was no color transference nor change in appearance for Fabric 9. The MPS for these two variables were met.

There was significant color loss shown with and without bleach by the 50th wash cycle (4, 1.2). The bleached sample lost significantly more color than the unbleached sample (2.42), failing to meet the MPS at the fifth laundering. The unbleached sample failed the MPS by the 50th cycle.

The warp of Fabric 9 showed significant shrinkage occurring between 1 and 5, 5 and 20, and 20 and 50 wash cycles (.24, .84, .82).

The bleached sample showed significantly more shrinkage than the unbleached specimen (.32). The significant interaction between wash number and bleach occurs at the 20th laundering (.9), at which time the bleached sample failed to meet the MPS. The unbleached sample was no longer acceptable at 50 washings. There was no difference in dimensional stability among different number of washings in the filling. Bleach was negatively associated with shrinkage in this direction (.29). The filling met the MPS for dimensional stability.

Fabric 9 passed the MPS for strength. It did have significant strength loss between the original fabric and that which had been laundered 50 times in both the warp and the filling (3.83, 4.67). The warp showed a significant loss by the fifth laundering (4.16) with no significant change after that point in time.

Fabric 10. Fabric 10 showed no color transference or change in appearance throughout the testing period. The MPS was surpassed for these two variables.

There was significant color loss in both bleached and unbleached samples (2, .7). Bleaching was found to be a significant factor (1.04). The unbleached sample showed no color loss until measurement after the 50th laundering (.07); at this time it was still acceptable in relation to the MPS. The bleached sample showed significant loss at the fifth laundering (.83) and failed to meet the MPS by the 20th cycle (2).

The warp and filling data for the dimensional stability showed significant losses between 1 and 5, 5 and 20, and 20 and 50 wash cycles (3.17, 1.18, 1.23) and (.57, 2.3, .8). The warp of the bleached sample showed significantly less shrinkage than the unbleached warp (.8). The unbleached warp failed in relation to performance standards

at five washings while the unbleached warp was acceptable until measurement at the 20th washing. The bleached filling shrank significantly more than the unbleached filling (.9); however, both samples failed to meet the MPS after one wash.

There was significant loss in tensile strength of Fabric 10 even though it met the MPS through 50 wash cycles. The significant loss occurred between the original and five washings (11.16). The bleached specimen lost significantly more strength (4.44), but an examination of the interaction showed that it was not a significant factor until the 50th cycle (11).

Fabric 11. Fabric 11 exhibited no significant change in color transference, color, appearance, or strength throughout the entire test period.

Significant shrinkage was noted in dimensional stability in both the warp and filling directions. There was a significant shrinkage in the warp after one wash (2.4) with significant shrinkage continuing to occur between 5 and 20, and 20 and 50 wash cycles (.6, .6). The filling showed significant shrinkage after one wash (.78) and in the subsequent wash cycles (.37, 1.32). Unbleached samples shrank significantly less than bleached samples (.46), with the interaction showing significant differences at 5, 20 and 50 launderings (.5, .5, .9).

Fabric 11 met all MPS used in this study.

Fabric 12. There was no significant difference noted in color transference, color, or appearance on Fabric 12. The MPS for these variables on Fabric 12 were surpassed.

The warp dimensional stability data showed significant shrinkage between wash 1 and 5, and 5 and 50 (.53, 2.89). The unbleached

specimen showed significantly more shrinkage in the warp (.75). The filling of Fabric 12 showed a significant amount of stretch at the first wash (.7). Significant shrinkage was noted between wash 1 and 5, 5 and 20, and 20 and 50 (.28, .27, 1.07). After 50 washes the filling showed significant shrinkage from the original (1.92). The fabric, however, met the MPS.

The bursting strength of Fabric 12 did show a significant loss between 0 and 5, and 5 and 50 launderings (24, 18.66). The total loss was not in excess of that allowed by the MPS.

Fabric 13. The color transference data for Fabric 13 showed a significant amount of wet transference on the original fabric (.5). No wet transference was noted at five washings nor was there any dry transference of color at either level. Color transference of this fabric met MPS.

There was no change in appearance throughout the repeated wash cycles of Fabric 13. The fabric met the appearance MPS.

There was no color loss on the unbleached specimen of Fabric 13 at 50 washings. The unbleached sample maintained MPS for color. However, the bleached sample showed significant loss by the fifth laundering (1.67) at which time it failed to meet the MPS for color. Significant losses of color continued throughout 50 washings on the bleached sample (.66).

The dimensional stability of Fabric 13 failed to meet MPS after one wash. The warp showed significant and progressive shrinkage occurring between 1 and 5, 5 and 20, and 20 and 50 wash cycles (.47, .42, 1.6). The unbleached sample showed more warp shrinkage than the bleached sample (.28). The interaction of wash number and bleach

shows this difference is only significant at the 20th washing (1.17). The filling showed significant shrinkage at the first wash (3.65), but the fabric stretched by the fifth to recover a significant amount of the shrinkage (1.62). The shrinkage from 5 to 20 was significant (1.28). Significant shrinkage was also noted between 20 and 50 washings. Both the warp and filling failed the dimensional stability MPS at measurement after one washing.

There was no significant loss of strength shown in either the warp or filling of Fabric 13.

Fabric 14. Fabric 14 showed no color transference. There was an unexplained significant difference in the appearance of the fabric at the fifth wash cycle (.7), but the appearance remained unchanged from the original at all other levels. At no point did Fabric 14 fail to meet the color transference or appearance MPS.

There was a significant difference in color loss between the bleached and unbleached samples of Fabric 14 (.29). A significant loss of color was noted on the bleached sample by wash number five (.4). No difference was noted on the unbleached sample until measurement at the 20th washing; at that time both samples failed to meet the performance standards for color change. There was significant color loss occurring between wash 20 and 50 on both samples (.35).

The dimensional stability MPS were met in both the warp and filling of Fabric 14. There was significant shrinkage noted between the first wash and the 50th wash in the warp (.82) with no significant shrinkage occurring after that. The filling showed significant loss between wash 1 and 5, and between 5 and 50 (.6, .6).

There was no significant loss of tensile strength in the warp of Fabric 14, but the filling did show a significant loss in strength at 50 washes from the original (1.67). The fabric met the MPS for strength in both warp and filling.

Fabric 15. There was no color transference noted on Fabric 15. Fabric 15 showed a significant change in appearance at the first laundering (.7). At the other wash levels, however, there was no significant change from the original.

Bleach had a significant effect on color loss of Fabric 15 (1.1). The bleached sample showed significant color loss by the fifth washing (.7), and failed MPS. Further significant color loss between 5 and 20 washes on the bleached sample (.33) was noted. The unbleached sample showed no significant loss in color until measurement at the 50th (1.2) wash cycle at which time it, too, failed to meet the MPS for color change.

There was significant shrinkage in dimensional stability of Fabric 15 in both warp and filling. The significant shrinkage was noted between washes 1 and 50 (.61) on the warp, and between 5 and 50 (2.6) in the filling.

The bursting strength of Fabric 15 showed a significant loss in strength between the original fabric and that which was washed five times (4.33). At 50 washes it was not significantly weaker than the original.

Fabric 15 met the MPS for color transference, appearance, and dimensional stability in both warp and filling and in tensile strength.

Fabric 16. No significant differences were noted in color transference, color loss, appearance or tensile strength on Fabric 16.

Fabric 16 also met MPS of dimensional stability. However, there were some significant differences noted. The warp showed significant shrinkage between wash 1 and 5 (1.23) and between 5 and 20 (1.77). The bleached sample showed significantly more shrinkage than the unbleached sample (2.67). In the filling, significant shrinkage was noted between 5 and 20 (1.57) and between 20 and 50 (.62) washings. The interaction of bleach and number of washes showed that the unbleached sample had significantly more shrinkage by 20 (.77) and 50 (1.13) wash cycles than the bleached sample.

Fabric 17. Fabric 17 showed no significant color transference either wet or dry. It also exhibited no change in appearance over the repeated launderings. The MPS for these variables were maintained.

The color change data of Fabric 17 showed significantly more color loss (.37) in the bleached sample. The bleached fabric showed significant loss at each measurement interval (.4, .43, .87). The unbleached sample showed no significant loss until measurement at the 50th wash level (.4). The bleached and unbleached samples both failed to meet the MPS for color at 50 wash cycles.

Significant shrinkage was noted in the dimensional stability of the warp between 1 and 5, and 5 and 50 washings (.63, 1.27). The bleached sample showed significantly more shrinkage in both the warp and filling than the unbleached sample (.34, .25). The shrinkage in the filling direction was not significant until measurement at five washings. The difference between 5 and 50 washes was found to be significant (.75). The dimensional stability of Fabric 17 met the MPS.

The bursting strength showed a significant loss over the 50 washings (3.2). However, the fabric washed five times showed a significant

increase in strength (1.5) over the original. Between 5 and 50 washings the loss in strength was found to be significant (4.7). At no point did the tensile data fail the MPS.

Fabric 18. The original sample of Fabric 18 showed a significant amount of color transference both wet and dry (2, .34). After five washes the dry sample no longer showed transference, but the wet still exhibited a significant amount (.84). The original fabric failed to meet the MPS for wet color transference.

There were no significant differences in color, appearance, or tensile strength of Fabric 18 at any level.

The warp dimensional stability data did show that significant shrinkage occurred between washes 5 and 50 (.33). The unbleached sample shrank significantly (.35) more than the bleached sample. An examination of the interaction between wash number and bleach showed the difference was significant at wash number one (.6) and at wash number five (.9). The filling also showed significant shrinkage between the wash 5 and 50 (1.8).

Fabric 18 met the MPS for dry color transference, color change, appearance, tensile strength and dimensional stability.

Fabric 19. Fabric 19 showed no significant color transference or color change throughout the testing period. The fabric met the MPS for these two areas.

The appearance of Fabric 19 did show a significant loss by the 20th washing (1). The bleached sample was significantly worse than the unbleached sample (.33). Fabric 19 met the MPS for appearance at all wash levels.

The dimensional stability of Fabric 19 met the MPS in both warp and filling. Neither warp nor filling showed any significant shrinkage until measurement at the fifth washing. The warp showed significant shrinkage between washes 5 and 20, and 20 and 50 (.6, .65). The filling showed significant shrinkage between washes 5 and 20 (1.34). The bleached sample shrank more in the filling than the unbleached sample (.31).

There was no significant difference in the warp tensile strength of Fabric 19. The filling did show a significant loss between the original fabric and that which was washed five times (5.16). The MPS for tensile strength were met by both the warp and filling.

Fabric 20. The MPS for color transference and color change were met by Fabric 20 as there was no significant difference noted in these variables.

There were unexplained fluctuations in the appearance of Fabric 20. There was a significant drop in appearance from the original at one wash (.5). The appearance level returned to the original at five washes with significant decreases noted between 5 and 20, and 20 and 50 washings (.35, .65). The unbleached sample scored significantly higher than the bleached sample (.42). At no point did the appearance fail the MPS.

Fabric 20 showed a significant difference in dimensional stability in both filling and warp. Significant shrinkage was noted between wash 1 and 50 in the filling (.26). The warp showed significant shrinkage occurring between washes 1 and 5, and between 5 and 50 (.35, 1.17). The fabric met the MPS for dimensional stability.

The tensile strength data for Fabric 20 showed the filling lost a significant amount of strength after 50 washings (5.17). The warp showed significant losses occurring between 0 and 5, and between 5 and 50 launderings (8, 15.6). The fabric at no point failed to meet the MPS for tensile strength.

Fabric 21. Fabric 21 showed significant color transference with the original fabric in both wet and dry (2.34 and .17). It had significant wet color transference at five launderings. The wet color transference failed to meet the MPS.

There was a significant change in color on Fabric 21 at 50 launderings (2.85). Bleach was found to cause significantly more color loss (2.04). The bleached sample failed to meet the MPS at five wash cycles while unbleached sample showed no significant change until measurement at the 20th cycle at which time it also failed the MPS. Significant losses were noted on the bleached sample between washes 1 and 5 (1.83), and between 5 and 50 (1.17). The unbleached sample lost significantly less color than the bleached sample at 5, 20 and 50 wash levels (1.83, .5, .3).

The dimensional stability of the warp showed significant shrinkage between wash numbers 1 and 50 (.8). The shrinkage occurred by the fifth washing (1.1). The filling showed significant shrinkage between washes 1 and 5, 5 and 20, and 20 and 50 (1.07, 1.85, .42). Fabric 21 met the MPS for dimensional stability.

There were no significant differences noted in the appearance or the bursting strength of Fabric 21.

Fabric 22. There was no dry color transference on Fabric 22. The wet color transference was only significant on the original fabric (.67). The fabric met the MPS for color transference.

There was a significant color loss noted on Fabric 22. Bleach caused significantly more color to be lost (2.04). The bleached sample showed a significant loss by the first wash at which time it failed to meet the MPS. The unbleached sample showed no significant loss until measurement at the 20th wash cycle at which time it also failed to meet the MPS.

The appearance of Fabric 22 never failed MPS, but it did show some fluctuation through the wash cycles. Between the first and fifth launderings there was a significant loss in the rating (1). At the 20th wash the fabric regained its original appearance, but the fabric lost a significant amount at the 50th wash cycle (.35).

The dimensional stability data for Fabric 22 showed significant shrinkage in both warp and filling. Shrinkage was noted between wash numbers 1 and 5 (.35, .3), and between 5 and 50 (.77 and .32). Both warp and filling met MPS for dimensional stability.

The bursting strength of Fabric 22 did show a significant loss between the original and that which was laundered five times (11.83). The strength loss was not in excess of that allowed by the MPS.

Fabric 23. Fabric 23 showed no significant color transference or change in tensile strength throughout the testing period.

The appearance of Fabric 23 did show significant degradation after the first wash (2). The fabric continued to show a significant loss between wash numbers 5 and 50 (.7). There was an unexplained improvement in the appearance at 20 washes (1). Fabric 23 failed to meet the MPS for appearance at the 50th wash level.

A significant amount of color was lost between the first and the fifth washings on Fabric 23 (.77). There was no further significant change noted after wash number five. The color loss was not in excess of that allowed by the MPS.

The dimensional stability data for Fabric 23 showed significant shrinkage in both warp and filling at the first wash (3.1, 4.0). The warp continued to show significant shrinkage between wash 1 and 5, and 5 and 50 (.7, .88). The filling also showed significant shrinkage at those levels (1.5 and 1.08). The filling failed to meet the MPS for dimensional stability at the fifth wash.

Bleach did not significantly affect any of the variables on this particular fabric.

Fabric 24. Fabric 24 showed a significant amount of wet color transference on the original sample and that which had been laundered five times. There was no significant dry color transference nor was there significant color change noted. The fabric met the MPS for these variables.

There was a significant change in the appearance by the first wash (1). No further difference was noted until measurement at the 50th wash (2) at which time it failed to meet the MPS.

The significant amount of shrinkage in the warp which had occurred on Fabric 24 after the first wash (6) caused it to fail the MPS for dimensional stability. It continued to show progressive shrinkage between washes 1 and 5, 5 and 20, and 20 and 50 (1.14, 2.36, 2.67). The filling also showed progressive shrinkage at the same levels (.84, 2.23, 5.57). The filling failed to meet the performance standard at the 20th wash cycle.

There was no significant change in the warp tensile strength on Fabric 24. The filling strength showed significant loss between the original and the fabric which was washed 50 times (6). Both warp and filling tensile strength met the MPS.

Fabric 24 was not bleached, so there are no comparisons to show the effect of bleach on the variables.

Fabric 25. There was no significant color transference either wet or dry on Fabric 25.

There was a significant loss in color on Fabric 25 between the first and fifth launderings (2.75 at which time it failed to meet the MPS. Significant color loss also occurred between wash numbers 5 and 50 (.83). The bleached sample lost significantly more color than the unbleached sample (1.67), with the difference being significant at wash levels 5 and 50 (.5, .5).

The significant deterioration of appearance at the first wash (3.35) was in excess of that allowed by the MPS. The fabric did show significant improvement between wash numbers 1 and 20, and 20 and 50 (.35, .34). The bleached sample was significantly lower in appearance ratings than the unbleached sample with the differences being significant at wash numbers 1, 5, and 50 (.7, .33, .67).

Fabric 25 failed to meet the MPS of the dimensional stability in the warp at the first wash. There was further significant shrinkage noted between wash numbers 1 and 5, and 5 and 50 (1.85, 2.95). The bleached sample shrank significantly more in the warp than the unbleached sample (.3). The filling showed significant shrinkage between wash numbers 1 and 5, and 5 and 50 (.58, 1.15). The filling did not fail the MPS until measurement at the 50th wash cycle.

There were significant losses in warp and filling strength noted between the 5th and 50th washes on Fabric 25 (5, 5). These losses were not in excess of that allowed by MPS.

Fabric 26. The wet color transference of Fabric 26 was significant on the original fabric (1.4) and was in excess of that allowed by the MPS. There was significant improvement in the wet color transference after five launderings (.9). There was no dry color transference noted.

The appearance of Fabric 26 showed no significant difference until measurement at the 20th wash cycle (.33). The bleached sample showed significantly more loss in appearance rating than the unbleached sample (.25). The difference was significant at the 20th and 50th wash cycles (.67, .33). The appearance of the fabric met the MPS.

Both bleached and unbleached samples of Fabric 26 showed significant progressive color loss at each observation point. The bleached sample lost significantly more color (.88). At the first wash the bleached sample had lost a significant amount of color to fail the MPS (1.33). It showed further significant loss between washes 1 and 5, and 5 and 50 (1.17, .5). The unbleached sample showed significant loss between washes 1 and 5 (.83), but it did not fail the MPS until the period between washes 5 and 20 (1). Between wash numbers 20 and 50 further significant color loss occurred (1.34).

Fabric 26 showed shrinkage in the warp between washes 1 and 5 (.87). However, between washes 5 and 20, and 20 and 50 there was a significant amount of stretch noted (2.6, .7). The warp met the MPS at all wash cycles. The filling showed significant shrinkage

occurring between wash numbers 1 and 5, 5 and 20, and 20 and 50 (2.26, 4.42, 3.33). The filling direction failed to meet the MPS at 20 wash cycles. The bleached samples showed significantly more shrinkage than the unbleached sample in the filling (1.42), with an examination of the interaction revealing the differences are significant at wash levels 20 and 50 (2.6, 3.5).

There was a significant loss in bursting strength noted on Fabric 26 between the original and that which had been laundered five times (6.16). The loss was not in excess of the MPS.

Fabric 27. Fabric 27 exceeded the MPS for color transference as there was no significant transference noted wet or dry.

Fabric 27 also passed the MPS for appearance. There was a significant change noted between the original and that which was laundered once (1). There was no further deterioration of appearance noted. However, there was an unexplained significant improvement noted between wash numbers 5 and 20 (.33).

There was significant color lost between washes 1 and 5, 5 and 20, and 20 and 50 on Fabric 27 (.83, 1.5, .42). The bleached sample showed significantly more color loss than the unbleached sample (.21). The difference was noted to be significant at the fifth wash level (.67). At that level the bleached sample failed to meet the MPS. The unbleached sample did not fail until measurement at the 20th laundering.

By the first wash, Fabric 27 had shown significant shrinkage in the warp (5.25) at which time it failed the MPS for dimensional stability. Significant shrinkage continued to occur between washes 1 and 5,

and 5 and 20 (1.99, 1.13). The filling showed an unexplained significant stretching between washes 1 and 5; significant shrinkage was shown between wash numbers 5 and 20, and 20 and 50 (3.08, .67). The unbleached sample showed significantly less shrinkage in the filling than the bleached sample (.27). The interaction of wash number and bleach showed that this difference was significant at the 20th washing (1.16). The filling of Fabric 27 met the MPS for dimensional stability.

The bursting strength data of Fabric 27 showed no significant loss of strength due to wash number. The bleached specimen was significantly weaker than the unbleached sample (2.11). The MPS for strength were met by this fabric.

Fabric 28. There was no significant wet or dry color transference or change in appearance of Fabric 28.

There was significant color loss on Fabric 28 between washes 5 and 20, and 20 and 50 (.58, .75). The bleached sample showed significantly more color loss than the unbleached sample (.13). The significant difference was noted at the 20th wash level (.5). Both the bleached and unbleached samples failed the MPS for color change at wash cycle number 50.

The MPS for dimensional stability were met by Fabric 28 in both warp and filling; however, significant differences were noted in both directions. The warp exhibited significant shrinkage between wash numbers 1 and 5, and 20 and 50 (.69, .38). The bleached specimen shrank less in the warp than the unbleached sample (.25) with the interaction showing significant differences between the samples at wash level 20 (.67). The filling showed significant shrinkage between

the 5th and 20th wash cycles (.57). The filling shrank more in the bleached sample (.42) exhibiting significant differences between the specimens at the 20th and 50th wash cycles (.5, 1).

There were no significant losses in filling tensile strength on Fabric 28. The warp tensile strength showed a significant loss between the 5th and 50th wash levels (2). The bleached sample lost significantly more warp strength (2.67), with the significant difference noted at 50 wash cycles (5). The warp and filling tensile strength met the MPS.

Fabric 29. The wet color transference was significant on both the original and washed sample (2.7, 2) of Fabric 29 and was in excess of that allowed by the MPS. There was no significant dry color transference.

There was significant color loss noted between wash numbers 1 and 5, 5 and 20, and 20 and 50 on Fabric 29 (.84, 1.67, .66). The bleached specimen lost significantly more color than the unbleached sample (.08) with the differences being significant at 5, 20, and 50 cycles (.33, .34, .33). Both the bleached and unbleached samples failed to meet the minimum performance standards by the 20th wash cycle.

The appearance of Fabric 29 showed a significant loss from the original (1). There was a significant improvement noted between wash 1 and 5 (.33); however, this was followed by a significant loss between the 5th and 20th wash cycles. The appearance met the MPS on Fabric 29.

There was significant shrinkage in warp of Fabric 29 in dimensional stability by the end of the first wash cycle (3.42). There was continued significant shrinkage noted between wash 1 and 5 (.4).

Between the 5th and 50th launderings the fabric showed significant growth (2.32). The unbleached sample showed significantly more shrinkage (1.61). The interaction of wash number and bleach showed the differences were significant at wash levels 1, 5, 20 and 50 (2.1, 1.77, 1.7, .86). The warp of Fabric 29 at no time failed to meet the MPS for dimensional stability. The filling showed significant shrinkage between wash numbers 1 and 5, 5 and 20, and 20 and 50 (1.61, 3.24, 2.51). The bleached filling shrank significantly more than the unbleached filling (2.8). The difference shown in the interaction was significant at all levels (1.3, 3.33, 2.73, 3.83). The bleached sample failed to meet the minimum dimensional stability MPS in the filling at the 20th wash cycle. The unbleached sample did not fail the MPS.

There was no significant change noted in bursting strength for Fabric 29 between the original fabric and that which was laundered 50 times. However, a significant gain in strength from the original was noted by the fifth laundering (7.17), followed by a significant loss in the remaining wash cycles (5.5). The strength of the Fabric 29 met the MPS.

Fabric 30. Fabric 30 showed significant wet color transference on the original fabric (.84), but significant improvement occurred after the sample was laundered five times (.67). There was no dry color transference noted. The color transference passed the MPS.

The appearance of Fabric 30 showed significant deterioration at the first wash and failed the MPS (3.83). Significant improvements were shown in appearance between wash numbers 1 and 5, and 5 and 20 (.67, 1.83), followed by a significant loss between the 20th and 50th washes (.5).

The color loss of fabric 30 was significant at one wash (1.9). Further significant losses were noted between washes 5 and 20, and 20 and 50 (.75, .25). The bleached sample lost significantly more color than the unbleached sample (2.41). The differences were significant at wash numbers 1, 5, 20 and 50 (2.17, 3, 2.5, 2). The bleached sample failed the MPS at the first washing. The unbleached sample did not fail until measurement at the 20th wash cycle.

The significant shrinkage of Fabric 30 in the warp at the first wash was in excess of that allowed by the MPS (15.4). Further significant shrinkage occurred between wash numbers 1 and 5, and 5 and 20 (1.45, 3.42). The loss of the bleached sample was significantly more than the unbleached sample (.2). The filling shrank a significant amount between the 20th and 50th launderings (.61) and shrank significantly more in the unbleached sample (.39). The interaction of wash number and effect of bleach showed the difference was significant at wash number 50 (.77). The filling met the dimensional stability MPS at all levels.

There was a significant loss of warp strength at five launderings on Fabric 30 (28.5). The filling strength showed a significant increase between wash numbers 5 and 50 (11.1). At no time did the tensile strength fail the MPS.

Fabric 31. The wet color transfer was significant on Fabric 31 in the original fabric and after laundering (4, 3.84). The fabric failed the MPS for wet color transference. No dry color transference was noted.

Significant color loss was noted on Fabric 31 at one wash with and without bleach (2.5, .5). Bleach was found to cause significantly

more loss (1.66). The differences were significant at wash levels 1, 2, 5, and 50 (2, 2.37, 1.67, .67). The bleached sample failed the MPS at the first wash level; the unbleached sample by the fifth wash.

The appearance of Fabric 31 showed a significant loss at the first wash (2.5). Further significant loss occurred by the fifth wash (1.33). Bleach caused significantly more loss in appearance (.33) with the losses being significant at the first and fifth wash levels (1.33). The bleached sample failed the MPS at the first washing, while the unbleached sample failed by the fifth washing.

The warp and filling of Fabric 31 showed significant shrinkage by the first wash (18.8, 13.7) at which time both failed the MPS. The warp showed further significant shrinkage between washes 1 and 5, and 5 and 50 (1.6, 3.7). The filling also showed significant shrinkage between the first and fifth washings (4.6).

The warp tensile strength showed significant losses in strength between the original fabric and that which was washed five times (22) with further significant losses occurring between wash numbers 5 and 50 (10.5). The warp strength loss was in excess of the MPS. The filling direction showed a significant increase in tensile strength by the fifth laundering.

Fabric 32. No dry color transference was noted on Fabric 32. There was significant wet color transference on the original fabric (1.84) at which time it failed the MPS. Significant improvement was shown after laundering (1.17), and at this level the fabric met the MPS.

The appearance of Fabric 32 did not change significantly over the test period.

No color loss was detected through five washings on Fabric 32. Significant color loss did occur between the 5th and 50th launderings (1.25). The bleached specimen showed significantly more color loss (.29). The difference was significant at the wash levels 20 and 50 (.33, .84). The unbleached specimen met the MPS at all levels; however, the bleached sample failed at wash number 50.

The dimensional stability data for Fabric 32 showed significant shrinkage occurring at the first wash in the warp (1.58) with further significant shrinkage between washes 1 and 5, and 5 and 50 (1.02, .83). At the fifth wash cycle the warp shrinkage exceeded the MPS. The filling also showed significant shrinkage at the first laundering and failed the MPS for dimensional stability. The differences between wash levels 1 and 5, 5 and 20, and 20 and 50 are also significant (2.01, 2.89, 5.53). The unbleached sample showed significantly more shrinkage (1) with the differences being significant at the first and 50th wash levels (1.6, 1.86).

The tensile strength data for the warp met the MPS with the only significant difference noted being a gain between the 5th and 50th wash cycles (1.34). The filling showed significant losses in strength between the original and that which was laundered five times and between wash numbers 5 and 50 (29.67, 20). The bleached sample lost significantly more strength (3.1). An examination of the interaction shows this difference was significant at wash number five (8). At this time the bleached sample failed the minimum performance standards while the unbleached sample did not fail until measurement at the 50th laundering.

Fabric 33. Fabric 33 showed no significant color transference. Significant losses of color were noted at the fifth laundering (1.41), at which time Fabric 33 failed the MPS for color change. Further significant loss was noted between washes 5 and 20 (1.09).

The appearance of Fabric 33 showed a significant change by the first wash (.5). No significant change was noted between wash 1 and 20 or between 1 and 50; however, a significant loss was noted between the first and fifth washes (.33). At no point did the appearance fail the MPS.

The warp of Fabric 33 showed significant shrinkage occurring between wash numbers 1 and 5, and 5 and 50 (1.35, 1.19). The bleached sample shrank significantly more than the unbleached sample (.25). The filling also showed significant shrinkage between washes 1 and 5, and 5 and 50 (1.35, 1.19). The bleached sample shrank significantly more in the filling direction (.81) with the analysis of the significant interaction showing the differences to be significant at wash levels 5, 20 and 50 (.8, 1, 1.1). At no point did the dimensional stability of Fabric 33 fail the MPS.

The bursting strength of Fabric 33 met the MPS. A significant loss of strength was noted, however, between the 5th and 50th washes (8.17).

Fabric 34. Fabric 34 failed to meet the MPS on the wet color transference on the original and laundered samples (1.27, 1). There was no dry color transference.

The appearance of Fabric 34 showed a significant loss by the fifth wash level (.35). Between washes 5 and 20 this loss was reversed showing no significant change in appearance at the 20th or 50th laundering. The appearance met the MPS at all wash levels.

Bleach caused significantly more color loss on Fabric 34 (1.17). This difference was significant at the fifth laundering (1.5), at which time the bleached sample failed to meet the MPS. The difference was also significant at wash levels 20 and 50 (2.17, 1). The unbleached sample failed to meet the MPS at 50 launderings.

The warp of Fabric 34 showed significant shrinkage by the first wash (3.67). Further significant shrinkage was noted between wash numbers 1 and 5, and 5 and 20 (2.61, 1.59). The warp failed the MPS by the fifth wash cycle. The filling showed a significant amount of stretch by the 50th wash cycle (.35). The bleached specimen stretched significantly more than the unbleached sample (.53) with the differences being significant at wash levels 5, 20, and 50 (.8, .77, .6). The filling passed the MPS for dimensional stability.

A significant loss was noted in the bursting strength of Fabric 34 after five launderings (12.67); however, the fabric met the MPS for strength.

Labeled and Unlabeled Fabrics. A comparison of the group of fabrics with care instructions provided and the group without care labeling did show significant differences in performance.

The wet color transference of the unlabeled fabrics was significantly greater than that shown on labeled fabrics (.7). There was no significant difference in dry color transference. Neither the unlabeled nor labeled groups of fabrics would fail the MPS for color transference.

Unlabeled fabrics had significantly more color loss and deterioration in appearance than labeled fabrics (1.09, .915). The unlabeled group of fabrics failed to meet the MPS for these two variables while the labeled group would pass.

The labeled group of fabrics showed significantly less shrinkage in both warp and filling (4.8, 2.14), and they did not show more shrinkage than is allowed by the MPS for dimensional stability. The unlabeled group failed to meet the MPS.

No significant differences with respect to warp tensile strength could be detected between the groups. The filling tensile strength was noted to be higher in the unlabeled group, but no differences were noted in loss of strength between the two groups. Both the labeled and unlabeled groups met the MPS for tensile strength.

CHAPTER 5

SUMMARY AND CONCLUSIONS

Past research studies indicate that care instructions provide valuable information for the consumers on labels. This view is possibly due to all the complexities of the market introduced by new fibers, finishes, and home laundry equipment. In order to provide the consumer with care information, the Federal Trade Commission promulgated The Care Labeling Rule which became effective July, 1972. The Rule stated that all imported or domestically manufactured textile products that require maintenance care must have a permanent label with care instructions attached to the garment. Also, a care label must be furnished with each piece of goods at the point of sale. Failure to follow this law would be construed as an unfair or deceptive method of competition.

The FTC called for comments from the general public in 1975 to review the Rule. Comments showed overall compliance in the ready-to-wear clothing market was good. However, there was one obvious area of failure to comply with the original rule. Seventy-five percent of those commenting indicated that care labels were not being supplied to them by sales people with piece goods purchased at the retail level (Federal Trade Commission, 1976, p. 3750). Other general comments also indicated that consumers are not always satisfied with care labels. Fifty-six percent felt that information given was often inaccurate and 70% found information on labels incomplete.

A review of the literature indicates that little research has been done on these problems of care labeling for piece goods on the retail market. If the effectiveness of need of the Care Labeling Rule is to be evaluated, some attention must be given to the piece goods market.

This study attempted to provide a basis to evaluate the effectiveness of the Care Labeling Rule in the piece goods market. There were two main objectives: (1) to determine if care labels are available and distributed with piece goods at the point of sale in the retail market; and (2) to determine if care labels supply adequate and accurate information.

To accomplish the first objective, 49 stores were selected in the Greensboro and Winston-Salem, North Carolina, and Washington, D. C. areas for the survey. These stores included a representative selection of department, discount and specialty stores selling piece goods. The researcher observed in each store to determine the types of fabrics consumers were purchasing and the availability of care labels.

Thirty-four samples of fabric representative of consumer purchases were secured for testing to determine if the care labels were adequate and accurate. All of the samples were designated to be refurbished under home laundry conditions. These were laundered as indicated by the care label or by standard household conditions in the absence of a label. The performance of fabrics was tested by modified standard procedures to determine color transfer, color loss, change in appearance, dimensional stability and loss of strength. These results were compared to minimum performance standards established by the researcher.

The survey of 49 retail fabric distributors clearly showed that care labels are rarely dispensed with retail fabric purchases. The sales personnel of only one store were observed to automatically include care labels with each purchase. However, the sales personnel of an additional 29% of stores indicated that they voluntarily included labels with each purchase. Fifty-one percent of the stores had care labels available on request from the consumer. Care labels were not available at the remaining 18% of the stores.

The results of the performance tests on the 34 fabrics indicate that the available care instructions were frequently inadequate or inaccurate for proper maintenance. Seventy-four percent of the fabrics failed to meet one or more of the minimum performance standards (MPS) by the 50th wash cycle as shown in Appendix E, Tables 20 and 21. An additional nine percent would pass all of the MPS at the 20th wash cycle. The two main areas of failure were excessive shrinkage and loss of color.

Fifty percent of the fabrics in this study showed shrinkage in excess of that allowed by the MPS for dimensional stability by the 50th wash cycle. Both filling and warp failed to meet MPS in 20% of the fabrics. An additional 18% failed in the warp and 12% in the filling. The shrinkage occurred before the 20th wash cycle in all but three percent of the fabrics. Bleach caused only one fabric sample to fail the MPS before the unbleached sample. However, the results of several fabrics did show unexplained statistically significant differences due to bleach. In some cases bleach accelerated shrinkage and in other cases it minimized shrinkage.

The MPS for color change was not met by 53% of the fabrics by the 20th wash level. An additional nine percent failed by the 50th wash level. Bleach caused an earlier failure in relation to the MPS on all but nine percent of the fabrics. If fabrics had been labeled with a precautionary note not to use chlorine bleach, only 32% would have failed MPS by 20 washes with 50% failing by 50.

The appearance ratings of 85% of the fabrics were acceptable in relation to the MPS by the 50th cycle. An additional six percent would have been acceptable by 20th wash cycle. Bleach only affected the point of failure in relation to Appearance MPS of three percent of the fabrics.

Dry color transference was not in excess of that allowed by the MPS on any fabric. Twenty-one percent of the fabrics failed to meet MPS on wet color transference on the original fabric. However, after laundering only nine percent failed due to the excess dye having been removed.

The MPS for tensile strength were met by 94% of the fabrics in this study. Bleach adversely affected three percent of the fabrics causing failure by the fifth wash cycle.

A comparison of the labeled and unlabeled fabrics showed that a significantly higher number of labeled fabrics met the MPS for all variables. By the 50th wash level 100% of the unlabeled fabrics failed one or more of the MPS, while 39% of the labeled fabrics passed all of the MPS. Upon measurement at the 20th wash cycle, 56% of the labeled fabrics were not acceptable as compared with 91% of the unlabeled fabrics.

In decreasing order of importance, fabric failure was caused by color change, dimensional instability, color transference, deterioration of appearance and decrease in tensile strength.

Implications

The results of this research indicate that the fabric manufacturers are not consistently supplying fabrics with adequate and accurate care information to the piece goods market. This supports similar findings of Mace (1974). Many fabrics have been shown to fail the implied warranty of the care label. This could be due to the fact that manufacturers hesitate to label the fabrics with the more restrictive care methods necessary for proper maintenance; this, in turn, would make the fabric less desirable to the consumer. Another possibility is that fabric manufacturers need to use more extensive testing programs and adequate performance standards. This would provide information which could be used to improve the quality of the piece goods available or facilitate more accurate care labeling. In this way, the effectiveness of the current care labeling requirements could be improved. Quality control beyond the manufacturer may be initially required to insure adequate performance of the products.

Another way to improve the effectiveness of the Care Labeling Rule is to insure the care label will be provided with piece goods purchases. As the Rule is presently written the retailer has accepted no responsibility for supplying care labels to the consumers with purchases of piece goods; the sole responsibility outlined by the Rule is for the manufacturer to supply the care labels to the

retailer. The results of this study, along with the comments received by the FTC clearly indicate that fabric retailers rarely voluntarily distribute the care labels to the consumers. Thus, the only consumers presently receiving care labels are those who are better informed and request the label, while the poorly informed consumer who has the greatest need for the label may not be sufficiently knowledgeable or aware to request it. Presently the consumer is paying for the cost of the care label in the cost of the fabric, but is receiving no benefit. It would appear that the retailers must be held responsible for transmitting care labels to the ultimate consumer as the intent of the Care Labeling Rule is not being carried out as the Rule is presently written, as was pointed out by Gray (Greenberger, 1977).

The consumer must assume some responsibility if the Care Labeling Rule is to work effectively. Care instructions are of no value unless they are used at the point of care. Consumers, however, will not use care labels until they are educated as to the importance and benefits of the care labeling program, and no amount of rule making will change this situation. Nearly all of the previous research supports the finding of importance of education and the actual use of care labels. They need to be informed as to the meaning of the label, why the label should be followed, and what recourse is available if the product fails to perform satisfactorily. Retailers could be held responsible to help with this education process by being required to post signs which explain the Care Labeling Rule.

Recommendations for Future Research

Based on this study the author recommends future research be conducted to determine improved methods of education to make care labeling more effective to the consumer. Such an investigation might include educational attempts by public education, extension programs, and other special forms of adult education such as sewing classes. Retail stores also offer the possibility of relaying information to the consumer through trained sales personnel and by information posted on placards or distributed with purchases explaining the benefits of care labeling. Other sources for consumer education include such mass media as radio, television, newspapers and popular magazines. If the most beneficial sources of information could be identified, the ramifications would go beyond the benefits to be gained by increased awareness and use of the Permanent Care Labeling Rule in both the piece goods and apparel markets; these sources may be relevant to the dissemination of other consumer information.

The other suggestion for future research is of a technical nature. Further investigation should be directed toward the effects of bleaching on dimensional stability of fabrics. As noted earlier, bleach did cause some unexplained differences to occur on various fabrics. Further research may explain this phenomenon with the ultimate objective of improving dimensional stability of problem fabrics.

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APPENDIX A

LIST OF STORES SURVEYED

LIST OF STORES SURVEYED

NAME	ADDRESS	STORE TYPE
Greensboro, North Carolina		
Belk Department Store	Carolina Circle Mall	Department
Belk Department Store	Four Seasons Shopping Center	Department
Belk Department Store	Friendly Center	Department
Creative Fabrics	2927 Pleasant Garden Rd.	Fabric
Fabric Discount House	1010 Tucker St.	Fabric
King's Department Store	4653 W. Market St.	Discount [a]
Knit-Fab	1206 E. Wendover Ave.	Fabric
Montgomery Ward	Carolina Circle Mall	Department
Paul Rose Department Store	Friendly Shopping Center	Discount
Penney, J. C. Company, Inc.	Four Seasons Shopping Center	Department
Piece Goods	1724 Battleground Ave.	Fabric
Piece Goods	High Point Road	Fabric
Piece Goods	Golden Gate Shopping Center	Fabric
Remnant Shop	3006 High Point Rd.	Fabric
Remnant Shop	Palmer Plaza	Fabric
Sears, Roebuck and Co.	Friendly Center	Department
Singer	Four Seasons Shopping Center	Fabric
Zayre Department Store	1421 E. Cone Blvd.	Discount
Zayre Department Store	3701 High Point Rd.	Discount

LIST OF STORES SURVEYED (Continued)

NAME	ADDRESS	STORE TYPE
Winston-Salem, North Carolina		
Anchor Company, Inc.	122 West 4th St.	Department
Belk Department Store	Hanes Mall	Department
Fabric Menagerie	444 North Trade St.	Fabric
Ideal Dry Goods Company	305 West 4th St.	Department
Kings Department Store	801 Corporation Pkwy.	Discount
McCrory Department Store	432 North Liberty St.	Discount
Paul Rose Department Store	North Side Shopping Center	Discount
Penney, J. C. Company, Inc.	Hanes Mall	Department
Piece Goods	2200 Cloverdale Ave.	Fabric
Piece Goods	Parkway Shopping Center	Fabric
Piece Goods	Pineridge Shopping Center	Fabric
Sears, Roebuck and Co.	Hanes Mall	Department
Singer	Thruway Shopping Center	Fabric
South Fork Cloth Shop	3911 Country Club Rd.	Fabric
Zayre Department Store	2281 Cloverdale Ave.	Discount
Washington, D. C. and Surrounding Suburbs		
B. Z. Fabrics, Inc.	Watergate Mall Washington, D. C.	Fabric
Barby's	Springfield Mall Springfield, VA	Fabric
Dee's Knit Fabrics	2501 N. Harrison Arlington, VA	Fabric
Hecht Company	7th and F N.W. Washington, D. C.	Department

LIST OF STORES SURVEYED (Continued)

NAME	ADDRESS	STORE TYPE
Hecht Company	Landmark Shopping Center Alexandria, VA	Department
Hecht Company	Tysons Corner Shopping Center McLean, VA	Department
Ida's Department Store	5601 Georgia Ave., N.W. Washington, D. C.	Department
L. T. Henry Fabric	Virginia Plaza Shopping Center Alexandria, VA	Fabric
Minnesota Fabrics	6602 Richmond Hwy. Alexandria, VA	Fabric
Murphy's	3000 Wilson Blvd. Arlington, VA	Discount
Needle and Thread	1632 Belle View Blvd. Alexandria, VA	Fabric
Penney, J. C. Company, Inc.	112 N. Washington Alexandria, VA	Department
Sears, Roebuck and Co.	4500 Wisconsin, N.W. Washington, D. C.	Department
Singer	Seven Corners Shopping Center Seven Corners, VA	Fabric
Woodward and Lothrup	Landmark Shopping Center Alexandria, VA	Department
Zayre Department Store	8425 Leesburg Pike Vienna, VA	Discount

[a] Discount stores are those purporting to sell merchandise below retail.

APPENDIX B

INFORMATION ON THE SELECTED FABRICS

INFORMATION ON THE SELECTED FABRICS

Fabric	Manufacturer	Fabric Description	Fiber Content	Care Method	Price Per Yard
1	Courtesy	Red Print Muslin	100% Cotton	1	$1.14
2	VIP Favorites	Red Print Percale	100% Cotton	1	$1.99
3	Peters Fabrics	Red Woven Plaid	30% Wool 35% Polyester 35% Acrylic	2	$5.99
4	J. P. Stevens	Red Wool Plaid	50% Wool, 50% Polyester	2	$5.99
5	J. P. Stevens	Burgandy Gabardine	70% Wool 30% Nylon	2	$5.99
6		Warp Knit Velour	80% Acetate 20% Nylon	2	$2.99
7	Milliken	Red and White Interlock Knit	100% Polyester	3	$2.88
8		Multi-color Interlock Knit	100% Polyester	3	$2.99
9	Martins	Black Print Velveteen		3	$8.99

Fabric	Manufacturer	Fabric Description	Fiber Content	Care Method	Price Per Yard
10	Calico Corner	Black Quilted Print	100% Cotton Face Polyester Fill 100% Acetate Back	3	$2.99
11	West Point Pepperell	Printed Flocked Foam	100% Nylon on Polyurethane	3	$2.99
12	Shenandoah Fabric	Orange Stripe Double-knit	100% Polyester	3	$5.00
13	Crompton	Red Print Corduroy	100% Cotton	3	$3.49
14		Red Dotted Swiss	65% Polyester 35% Cotton	3	$1.49
15	Klopman	Pink Jersey Knit	65% Polyester 35% Cotton	3	$3.49
16	Klopman	Orange Jersey Knit	100% Polyester	4	$2.99
17	Klopman	Red Print Single Knit	100% Polyester	4	$3.99
18	Klopman	Red Interlock Knit	100% Nylon	4	$3.99
19	Klopman	Pink Novelty Weave	100% Polyester	4	$3.99
20	Klopman	Blue Chino	75% Polyester 25% Cotton	4	$2.99

Fabric	Manufacturer	Fabric Description	Fiber Content	Care Method	Price Per Yard
21	BRW	Green Warp Knit Velour	80% Triacetate 20% Nylon	4	$3.99
22		Red Two-Face Suede Cloth	42% Acrylic 38% Rayon 16% Polyester 4% Cotton	4	$8.29
23	Julliard United Merchants	Burgundy Challis	100% Rayon	5	$1.99
24	Amana Woolen Mills	Green Plaid	(? Wool)[a]		$8.00
25		Satin with Milium Finish	(? Acetate)		$1.99
26		Pink Warp Knit Suede Cloth	(? Acetate/Nylon)		$1.88
27		Blue Print Tricot	(? Acetate/Nylon)		$1.99
28		Burgundy Print Percale	(? Polyester/Cotton)		$2.49
29		Red Warp Knit Suede Cloth	(? Triacetate)		$2.99
30		Red Moire	(? Rayon/Acetate)		$2.79

Fabric	Manufacturer	Fabric Description	Fiber Content	Care Method	Price Per Yard
31		Multicolor Tapestry	(? Rayon/Acetate/ Cotton)		$2.99
32		Red Woven Metallic	(? Nylon/Metallic)		$4.99
33		Metalic Coated Tricot	(? Nylon)		$7.99
34		Burgundy Knit Corduroy	(? Polyester)		$2.99

Note. Missing information was not available.

[a] (?) indicates probable fiber content.

APPENDIX C

MEAN RESULTS FOR PERFORMANCE TESTS

Table 5

Means of Color Transference Ratings

for Individual Fabrics

Fabric	Number of Washes	Mean Wet Color Transference [a]	Mean Dry Color Transference [a]
1	0	5.0	5.0
1	5	5.0	5.0
2	0	4.5	5.0
2	5	5.0	5.0
3	0	4.67	5.0
3	5	4.83	5.0
4	0	4.5	5.0
4	5	4.83	5.0
5	0	4.5	5.0
5	5	4.67	5.0
6	0	4.83	5.0
6	5	5.0	5.0
7	0	5.0	5.0
7	5	5.0	5.0
8	0	5.0	5.0
8	5	5.0	5.0
9	0	4.83	5.0
9	5	5.0	5.0
10	0	5.0	5.0
10	5	5.0	5.0
11	0	5.0	5.0
11	5	5.0	5.0
12	0	5.0	5.0
12	5	5.0	5.0
13	0	4.5	5.0
13	5	5.0	5.0
14	0	5.0	5.0
14	5	5.0	5.0
15	0	5.0	5.0
15	5	5.0	5.0
16	0	5.0	5.0
16	5	5.0	5.0
17	0	5.0	5.0
17	5	5.0	5.0
18	0	3.0	4.67
18	5	4.17	5.0
19	0	5.0	5.0

Table 5 (Continued)

Fabric	Number of Washes	Mean Wet Color Transference [a]	Mean Dry Color Transference [a]
19	5	5.0	5.0
20	0	5.0	5.0
20	5	5.0	5.0
21	0	2.67	4.83
21	5	4.0	5.0
22	0	4.3	5.0
22	5	4.83	5.0
23	0	5.0	5.0
23	5	5.0	5.0
24	0	4.67	5.0
24	5	4.67	5.0
25	0	5.0	5.0
25	5	5.0	5.0
26	0	3.67	5.0
26	5	4.5	5.0
27	0	5.0	5.0
27	5	5.0	5.0
28	0	5.0	5.0
28	5	5.0	5.0
29	0	2.33	5.0
29	5	3.0	5.0
30	0	4.17	5.0
30	5	4.83	5.0
31	0	1.0	5.0
31	5	1.17	5.0
32	0	3.17	5.0
32	5	4.33	5.0
33	0	5.0	5.0
33	5	5.0	5.0
34	0	3.83	5.0
34	5	4.0	5.0

Note. Mean of all standard deviations for wet color transference is .089
Mean of all standard deviations for dry color transference is .0085.

[a] All means are based on three observations.

Table 6

Means of Color Transference Ratings

Over All Fabrics

Labeled or Unlabeled	Number of Washes	Number of Observations	Mean Wet Color Transference	Mean Dry Color Transference
UL [a]	0	33	3.89	5.0
UL	5	33	4.23	5.0
L [b]	0	69	4.67	4.98
L	5	68	4.89	5.0

[a] UL indicates unlabeled fabrics.

[b] L indicates labeled fabrics

Table 7

Means of Color and Appearance Ratings

for Individual Fabrics

Fabric	Bleached or Unbleached	Number of Washes	Mean of Color Rating [a]	Mean of Appearance Rating [a]
1	B	1	5.0	4.0
	B	5	5.0	4.33
	B	20	5.0	4.0
	B	50	4.83	3.33
	U	1	5.0	3.33
	U	5	5.0	4.00
	U	20	4.83	4.0
	U	50	4.93	4.0
2	B	1	5.0	4.0
	B	5	4.0	4.33
	B	20	3.83	3.67
	B	50	3.67	4.0
	U	1	5.0	3.33
	U	5	5.0	3.67
	U	20	5.0	4.0
	U	50	4.83	4.0
3	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	5.0	5.0
4	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	5.0	5.0
5	U	1	5.0	4.0
	U	2	5.0	4.0
	U	20	5.0	4.67
	U	50	3.67	5.0
6	B	1	4.5	5.0
	B	5	2.83	5.0
	B	20	2.0	5.0
	B	50	1.83	5.0
	U	1	5.0	5.0
	U	5	4.67	5.0
	U	20	2.67	5.0
	U	50	1.83	5.0

Table 7 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean of Color Rating [a]	Mean of Appearance Rating [a]
7	B	1	5.0	5.0
	B	5	5.0	5.0
	B	20	5.0	5.0
	B	50	5.0	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	5.0	5.0
8	B	1	5.0	5.0
	B	5	5.0	5.0
	B	20	5.0	5.0
	B	50	5.0	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	5.0	5.0
9	B	1	5.0	5.0
	B	5	1.67	5.0
	B	20	1.5	5.0
	B	50	1.0	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	3.8	5.0
10	B	1	5.0	5.0
	B	5	4.17	5.0
	B	20	3.0	5.0
	B	50	3.0	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	4.3	5.0
11	B	1	5.0	5.0
	B	5	5.0	5.0
	B	20	5.0	5.0
	B	50	5.0	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	5.0	5.0
12	B	1	5.0	5.0
	B	5	5.0	5.0
	B	20	5.0	5.0
	B	50	5.0	5.0
	U	1	5.0	5.0

Table 7 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean of Color Rating [a]	Mean of Appearance Rating [a]
12	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	5.0	5.0
13	B	1	5.0	5.0
	B	5	3.33	5.0
	B	20	3.17	5.0
	B	50	2.67	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	5.0	5.0
14	B	1	5.0	5.0
	B	5	4.67	4.33
	B	20	3.5	5.0
	B	50	3.0	5.0
	U	1	5.0	5.0
	U	5	5.0	4.3
	U	20	3.83	5.0
	U	50	3.5	5.0
15	B	1	5.0	4.33
	B	5	3.5	4.67
	B	20	3.0	5.0
	B	50	3.0	5.0
	U	1	5.0	4.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	3.83	5.0
16	B	1	5.0	5.0
	B	5	5.0	5.0
	B	20	5.0	5.0
	B	50	4.83	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	5.0	5.0
17	B	1	5.0	5.0
	B	5	4.67	5.0
	B	20	4.17	5.0
	B	50	3.33	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	3.67	5.0
18	B	1	5.0	5.0

Table 7 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean of Color Rating [a]	Mean of Appearance Rating [a]
18	B	5	5.0	5.0
	B	20	5.0	5.0
	B	50	5.0	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	4.83	5.0
19	B	1	5.0	5.0
	B	5	5.0	5.0
	B	20	5.0	4.0
	B	50	4.83	3.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	4.0
	U	50	5.0	4.3
20	B	1	5.0	4.0
	B	5	5.0	5.0
	B	20	5.0	4.3
	B	50	5.0	4.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	5.0	4.0
21	B	1	5.0	5.0
	B	5	3.17	5.0
	B	20	3.0	5.0
	B	50	2.0	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	3.5	5.0
	U	50	2.33	5.0
22	B	1	2.33	5.0
	B	5	2.33	4.0
	B	20	2.0	5.0
	B	50	1.83	5.0
	U	1	5.0	5.0
	U	5	4.83	4.67
	U	20	3.5	5.0
	U	50	3.33	4.33
23	B	1	5.0	3.0
	B	5	4.17	3.0
	B	20	4.0	4.0
	B	50	4.17	2.67
	U	1	5.0	3.0
	U	5	5.0	3.0

Table 7 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean of Color Rating [a]	Mean of Appearance Rating [a]
23	U	20	4.33	4.0
	U	50	4.17	2.0
24	U	1	5.0	4.0
	U	5	5.0	4.0
	U	20	5.0	4.0
	U	50	5.0	2.0
25	B	1	5.0	1.33
	B	5	2.0	1.67
	B	20	1.33	2.0
	B	50	1.17	2.0
	U	1	5.0	2.0
	U	5	2.5	2.0
	U	20	1.5	2.0
	U	50	1.17	2.67
26	B	1	3.67	5.0
	B	5	2.5	5.0
	B	20	2.5	4.33
	B	50	2.0	4.67
	U	1	5.0	5.0
	U	5	4.17	5.0
	U	20	3.17	5.0
	U	50	1.83	5.0
27	B	1	5.0	4.33
	B	5	3.83	4.33
	B	20	2.67	4.0
	B	50	2.17	4.0
	U	1	5.0	3.67
	U	5	4.5	4.33
	U	20	2.67	4.0
	U	50	2.33	4.0
28	B	1	5.0	5.0
	B	5	4.83	5.0
	B	20	4.0	5.0
	B	50	3.5	5.0
	U	1	5.0	5.0
	U	5	4.83	5.0
	U	20	4.5	5.0
	U	50	3.5	5.0
29	B	1	5.0	4.0
	B	5	4.0	4.33
	B	20	2.67	4.0
	B	50	1.67	4.0
	U	1	5.0	4.0
	U	5	4.33	4.33
	U	20	2.33	3.67
	U	50	2.0	4.0

Table 7 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean of Color Rating [a]	Mean of Appearance Rating [a]
30	B	1	2.0	1.33
	B	5	1.0	1.67
	B	20	1.0	3.33
	B	50	1.0	3.0
	U	1	4.17	1.0
	U	5	4.0	2.0
	U	20	3.5	4.0
	U	50	3.0	3.33
31	B	1	2.5	2.0
	B	5	1.33	1.0
	B	20	1.0	1.0
	B	50	1.0	1.0
	U	1	4.5	3.0
	U	5	3.67	1.33
	U	20	2.67	1.0
	U	50	1.67	1.0
32	B	1	5.0	5.0
	B	5	5.0	5.0
	B	20	4.67	5.0
	B	50	3.33	5.0
	U	1	5.0	5.0
	U	5	5.0	5.0
	U	20	5.0	5.0
	U	50	4.17	5.0
33	B	1	5.0	5.0
	B	5	3.67	4.33
	B	20	1.5	4.0
	B	50	1.33	5.0
	U	1	5.0	4.0
	U	5	3.5	4.0
	U	20	1.5	5.0
	U	50	1.33	4.0
34	B	1	5.0	5.0
	B	5	3.33	4.33
	B	20	2.5	5.0
	B	50	2.17	5.0
	U	1	5.0	4.67
	U	5	4.83	5.0
	U	20	4.67	5.0
	U	50	3.17	5.0

Note: Mean of all standard deviations for color ratings is .09.
Mean of all standard deviations for appearance rating is .09.

[a] All means are based on three observations.

Table 8

Means of Color and Appearance Ratings

Over All Fabrics

Labeled or Unlabeled	Bleached or Unbleached	Number of Observations	Mean Color Rating	Mean Appearance Rating
UL [a]	B [c]	120	2.95	3.78
UL	U [d]	132	3.77	3.82
L [b]	B	240	4.16	4.70
L	U	276	4.73	4.72

[a] UL indicates unlabeled fabrics.

[b] L indicates labeled fabrics.

[c] B indicates bleached fabrics.

[d] U indicates unbleached fabrics.

Table 9

Means of Warp and Filling Dimensional Stability for Individual Fabrics

Fabric	Bleached or Unbleached	Number of Washes	Mean Percent Warp Loss[a]	Mean Percent Filling Loss[a]
1	B	1	2.73	1.17
	B	5	4.10	1.10
	B	20	5.87	.83
	B	50	6.90	.40
	U	1	2.77	1.87
	U	5	4.27	1.33
	U	20	6.50	.43
	U	50	6.87	.27
2	B	1	1.83	5.70
	B	5	2.13	6.10
	B	20	2.17	6.27
	B	50	3.43	6.77
	U	1	1.87	5.50
	U	5	2.57	5.93
	U	20	3.03	6.20
	U	50	3.70	6.23
3	U	1	.20	+ .20
	U	5	.53	+ .10
	U	20	.57	+ .10
	U	50	.60	.00
4	U	1	1.23	.10
	U	5	1.87	.20
	U	20	1.43	.33
	U	50	1.40	.23
5	U	1	3.77	.17
	U	5	3.70	.60
	U	20	3.60	.80
	U	50	3.93	1.00
6	B	1	1.07	.37
	B	5	2.40	2.37
	B	20	1.73	5.00
	B	50	1.77	7.30
	U	1	1.40	.13
	U	5	2.13	1.83
	U	20	2.13	3.67
	U	50	2.10	5.30

Table 9 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean Percent Warp Loss [a]	Mean Percent Filling Loss [a]
7	B	1	.23	.03
	B	5	1.90	+ .13
	B	20	2.03	+ .07
	B	50	3.43	.70
	U	1	.40	.43
	U	5	1.57	.53
	U	20	2.00	.90
	U	50	3.50	1.57
8	B	1	.43	+ .17
	B	5	1.00	.30
	B	20	1.87	1.10
	B	50	2.87	2.60
	U	1	.77	+ .07
	U	5	1.67	.23
	U	20	2.33	1.70
	U	50	2.93	2.77
9	B	1	1.40	.97
	B	5	1.63	.70
	B	20	3.00	.87
	B	50	3.70	.80
	U	1	1.53	1.27
	U	5	1.80	.60
	U	20	2.10	1.30
	U	50	3.03	1.30
10	B	1	1.77	8.27
	B	5	4.77	8.97
	B	20	5.43	11.37
	B	50	6.90	12.17
	U	1	1.93	7.63
	U	5	5.27	8.07
	U	20	6.97	10.33
	U	50	7.97	11.13
11	B	1	2.60	.83
	B	5	2.77	.90
	B	20	2.93	1.80
	B	50	3.73	2.00
	U	1	2.20	.73
	U	5	2.27	1.40
	U	20	3.43	2.30
	U	50	3.80	2.93
12	B	1	.37	+ .87
	B	5	.83	+ .36
	B	20	1.87	+ .10
	B	50	2.43	1.27
	U	1	.83	+ .53

Table 9 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean Percent Warp Loss[a]	Mean Percent Filling Loss[a]
12	U	5	1.43	+ .46
	U	20	2.63	+ .20
	U	50	3.60	1.16
13	B	1	2.53	3.73
	B	5	3.00	2.17
	B	20	2.87	3.43
	B	50	5.10	2.87
	U	1	2.53	3.57
	U	5	3.07	1.90
	U	20	4.03	3.20
	U	50	5.00	2.87
14	B	1	.53	.03
	B	5	.56	.67
	B	20	.93	.90
	B	50	1.10	1.10
	U	1	.03	.17
	U	5	.63	.77
	U	20	1.20	.90
	U	50	1.33	1.50
15	B	1	1.27	2.23
	B	5	1.60	1.80
	B	20	1.83	4.13
	B	50	2.03	4.30
	U	1	1.23	2.17
	U	5	1.53	1.77
	U	20	1.73	4.27
	U	50	1.70	4.43
16	B	1	+ .10	.33
	B	5	1.47	.17
	B	20	3.07	1.40
	B	50	3.17	1.83
	U	1	+ .07	.10
	U	5	.83	.27
	U	20	2.77	2.17
	U	50	3.00	2.97
17	B	1	.33	.03
	B	5	.83	.43
	B	20	2.50	1.93
	B	50	2.13	2.73
	U	1	+ .13	.13
	U	5	.63	.23
	U	20	2.07	1.40
	U	50	1.87	2.37
18	B	1	.17	+ .23
	B	5	.23	+ .13

Table 9 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean Percent Warp Loss [a]	Mean Percent Filling Loss [a]
18	B	20	1.00	1.03
	B	50	.97	1.70
	U	1	.77	.03
	U	5	.97	+ .33
	U	20	1.13	1.00
	U	50	.90	1.43
19	B	1	+ .03	.07
	B	5	.03	.03
	B	20	.67	1.27
	B	50	1.57	1.70
	U	1	+ .13	+ .17
	U	5	.20	.03
	U	20	.73	.87
	U	50	1.13	1.10
20	B	1	.90	+ .20
	B	5	1.10	+ .10
	B	20	2.03	.03
	B	50	2.37	.07
	U	1	.70	+ .17
	U	5	1.20	+ .07
	U	20	2.07	.10
	U	50	2.27	.10
21	B	1	.80	.13
	B	5	1.77	1.13
	B	20	1.53	2.97
	B	50	1.43	3.37
	U	1	.77	.20
	U	5	1.83	1.33
	U	20	1.57	3.20
	U	50	1.73	3.70
22	B	1	+ .10	.30
	B	5	.33	.60
	B	20	.67	1.10
	B	50	1.13	1.00
	U	1	.07	.27
	U	5	.33	.57
	U	20	1.10	.90
	U	50	1.00	.80
23	B	1	3.30	3.70
	B	5	3.93	5.93
	B	20	4.63	6.17
	B	50	4.93	6.50
	U	1	3.00	4.33
	U	5	3.77	5.10
	U	20	4.53	6.47
	U	50	4.53	6.70

Table 9 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean Percent Warp Loss [a]	Mean Percent Filling Loss [a]
7	B	1	.23	.03
	B	5	1.90	+ .13
	B	20	2.03	+ .07
	B	50	3.43	.70
	U	1	.40	.43
	U	5	1.57	.53
	U	20	2.00	.90
	U	50	3.50	1.57
8	B	1	.43	+ .17
	B	5	1.00	.30
	B	20	1.87	1.10
	B	50	2.87	2.60
	U	1	.77	+ .07
	U	5	1.67	.23
	U	20	2.33	1.70
	U	50	2.93	2.77
9	B	1	1.40	.97
	B	5	1.63	.70
	B	20	3.00	.87
	B	50	3.70	.80
	U	1	1.53	1.27
	U	5	1.80	.60
	U	20	2.10	1.30
	U	50	3.03	1.30
10	B	1	1.77	8.27
	B	5	4.77	8.97
	B	20	5.43	11.37
	B	50	6.90	12.17
	U	1	1.93	7.63
	U	5	5.27	8.07
	U	20	6.97	10.33
	U	50	7.97	11.13
11	B	1	2.60	.83
	B	5	2.77	.90
	B	20	2.93	1.80
	B	50	3.73	2.00
	U	1	2.20	.73
	U	5	2.27	1.40
	U	20	3.43	2.30
	U	50	3.80	2.93
12	B	1	.37	+ .87
	B	5	.83	+ .36
	B	20	1.87	+ .10
	B	50	2.43	1.27
	U	1	.83	+ .53

Table 9 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean Percent Warp Loss [a]	Mean Percent Filling Loss [a]
24	U	1	5.83	1.23
	U	5	6.97	2.17
	U	20	9.33	4.30
	U	50	12.00	9.87
25	B	1	3.10	1.33
	B	5	5.60	1.37
	B	20	6.73	2.10
	B	50	8.17	2.93
	U	1	3.50	.97
	U	5	4.70	2.10
	U	20	6.27	2.20
	U	50	8.03	2.83
26	B	1	2.20	.33
	B	5	3.00	2.33
	B	20	.50	8.30
	B	50	+ .53	12.10
	U	1	2.07	.30
	U	5	3.00	2.83
	U	20	.30	5.70
	U	50	+ .10	8.57
27	B	1	5.33	.47
	B	5	7.10	+ .07
	B	20	7.80	2.37
	B	50	8.37	3.53
	U	1	5.17	.30
	U	5	7.70	+ .20
	U	20	8.43	3.53
	U	50	8.37	3.70
28	B	1	.63	.63
	B	5	1.37	.87
	B	20	1.33	1.87
	B	50	1.93	1.13
	U	1	.73	.60
	U	5	1.37	.73
	U	20	2.00	.87
	U	50	2.17	.63
29	B	1	2.37	+ .53
	B	5	2.93	2.10
	B	20	1.97	5.03
	B	50	1.07	8.40
	U	1	4.47	+1.83
	U	5	4.70	+1.23
	U	20	3.67	2.30
	U	50	1.93	4.57

Table 9 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean Percent Warp Loss [a]	Mean Percent Filling Loss [a]
30	B	1	15.50	.53
	B	5	16.50	.60
	B	20	18.67	.27
	B	50	20.50	.80
	U	1	15.30	.57
	U	5	17.20	.77
	U	20	18.07	.87
	U	50	19.60	1.57
31	B	1	18.87	13.70
	B	5	20.40	18.37
	B	20	21.07	18.67
	B	50	24.23	18.17
	U	1	18.73	13.70
	U	5	20.30	18.13
	U	20	21.07	18.47
	U	50	24.00	17.67
32	B	1	1.23	3.17
	B	5	2.63	5.83
	B	20	2.73	8.77
	B	50	3.33	13.47
	U	1	1.93	4.77
	U	5	2.57	6.13
	U	20	2.53	8.97
	U	50	3.53	15.33
33	B	1	1.27	2.00
	B	5	2.33	3.60
	B	20	2.53	4.70
	B	50	2.70	4.90
	U	1	1.37	1.67
	U	5	2.03	2.77
	U	20	2.17	3.70
	U	50	2.27	3.83
34	B	1	3.30	+ .03
	B	5	6.27	+ .73
	B	20	7.77	+ .67
	B	50	8.10	+ .70
	U	1	4.03	+ .07
	U	5	6.30	.06
	U	20	7.97	.10
	U	50	8.43	+ .10

[a] All means are based on three observations.

Table 10

Means of Warp and Filling Dimensional Stability

Over All Fabrics

Labeled or Unlabeled	Bleached or Unbleached	Number of Washes	Number of Observations	Mean Percent Warp Loss	Mean Percent Filling Loss
UL[a]	B[c]	1	30	5.38	2.17
UL	B	5	30	6.81	3.43
UL	B	20	30	7.11	5.14
UL	B	50	30	7.79	6.47
L[b]	B	1	60	1.10	1.32
L	B	5	60	1.82	1.63
L	B	20	60	2.43	2.57
L	B	50	60	3.06	3.06
UL	U[d]	1	33	5.73	2.02
UL	U	5	33	6.98	3.11
UL	U	20	33	7.44	4.64
UL	U	50	33	8.20	6.22
L	U	1	69	1.20	1.20
L	U	5	69	1.92	1.38
L	U	20	69	2.59	2.27
L	U	50	69	2.95	2.69

[a] UL indicates unlabeled fabrics.
[b] L indicates labeled fabrics.
[c] B indicates bleached fabrics.
[d] U indicates unbleached fabrics.

Table 11

Means of Warp and Filling Tensile Strength

for Individual Fabrics

Fabric	Bleached or Unbleached	Number of Washes	Mean Warp Tensile Strength	Mean Filling Tensile Strength
1	B	0	52.00	23.33
	B	5	47.67	20.33
	B	50	44.00	19.00
	U	0	52.00	23.33
	U	5	49.67	21.00
	U	50	48.00	21.67
2	B	0	45.67	29.00
	B	5	44.33	25.67
	B	50	40.67	28.00
	U	0	45.67	29.00
	U	5	41.33	30.00
	U	50	42.00	32.67
3	U	0	34.33	28.00
	U	5	34.00	27.00
	U	50	30.00	25.00
4	U	0	28.67	35.67
	U	5	30.00	36.33
	U	50	29.00	33.00
5	U	0	33.33	23.67
	U	5	33.67	24.33
	U	50	33.00	22.33
6	B	0	73.00	
	B	5	71.67	
	B	50	70.00	
	U	0	72.33	
	U	5	70.00	
	U	50	69.67	
7	B	0	74.33	
	B	5	73.00	
	B	50	67.33	
	U	0	74.33	
	U	5	74.00	
	U	50	69.33	
8	B	0	106.67	
	B	5	100.33	
	B	50	92.33	

Table 11 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean Warp Tensile Strength	Mean Filling Tensile Strength
8	U	0	106.67	
	U	5	99.67	
	U	50	88.33	
9	B	0	50.33	44.00
	B	5	45.00	38.33
	B	50	45.33	37.67
	U	0	50.33	44.00
	U	5	47.33	42.00
	U	50	47.66	41.00
10	B	0	144.67	
	B	5	132.33	
	B	50	128.33	
	U	0	144.67	
	U	5	134.67	
	U	50	139.33	
11	B	0	85.33	
	B	5	84.67	
	B	50	84.33	
	U	0	85.33	
	U	5	85.67	
	U	50	85.00	
12	B	0	187.33	
	B	5	162.00	
	B	50	144.33	
	U	0	187.33	
	U	5	164.67	
	U	50	145.00	
13	B	0	53.33	33.00
	B	5	54.33	29.67
	B	50	49.00	33.33
	U	0	53.33	33.00
	U	5	52.33	31.33
	U	50	53.33	31.00
14	B	0	53.00	36.00
	B	5	54.00	35.67
	B	50	51.67	33.33
	U	0	53.00	36.00
	U	5	52.33	35.67
	U	50	51.67	35.33
15	B	0	104.67	
	B	5	101.00	
	B	50	103.33	
	U	0	104.67	
	U	5	99.67	
	U	50	99.67	

Table 11 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean Warp Tensile Strength	Mean Filling Tensile Strength
16	B	0	103.67	
	B	5	104.00	
	B	50	106.67	
	U	0	103.67	
	U	5	102.67	
	U	50	103.67	
17	B	0	107.67	
	B	5	109.00	
	B	50	103.33	
	U	0	107.67	
	U	5	109.33	
	U	50	105.67	
18	B	0	89.33	
	B	5	89.33	
	B	50	89.67	
	U	0	89.33	
	U	5	90.00	
	U	50	89.67	
19	B	0	129.33	98.67
	B	5	124.33	95.33
	B	50	122.00	96.33
	U	0	129.33	98.67
	U	5	124.00	101.33
	U	50	123.67	103.33
20	B	0	154.67	110.67
	B	5	146.00	108.67
	B	50	130.33	105.33
	U	0	154.67	110.67
	U	5	147.33	107.00
	U	50	132.67	105.67
21	B	0	64.33	
	B	5	63.67	
	B	50	63.67	
	U	0	64.33	
	U	5	63.67	
	U	50	63.33	
22	B	0	181.33	
	B	5	168.00	
	B	50	163.33	
	U	0	181.33	
	U	5	171.00	
	U	50	167.67	
23	B	0	46.33	33.67
	B	5	44.67	33.67
	B	50	42.00	31.33

Table 11 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean Warp Tensile Strength	Mean Filling Tensile Strength
23	U	0	46.33	33.67
	U	5	46.67	34.33
	U	50	45.67	34.67
24	U	0	34.33	27.67
	U	5	31.67	25.67
	U	50	29.67	21.67
25	B	0	45.00	24.33
	B	5	44.33	23.67
	B	50	40.67	19.67
	U	0	45.00	24.33
	U	5	44.33	23.00
	U	50	38.00	19.00
26	B	0	73.67	
	B	5	80.67	
	B	50	79.67	
	U	0	73.67	
	U	5	79.00	
	U	50	81.33	
27	B	0	132.00	
	B	5	130.00	
	B	50	129.00	
	U	0	132.00	
	U	5	134.00	
	U	50	131.33	
28	B	0	56.67	28.67
	B	5	55.67	28.33
	B	50	52.67	27.33
	U	0	56.67	28.67
	U	5	58.67	28.33
	U	50	67.67	28.33
29	B	0	111.33	
	B	5	119.67	
	B	50	111.67	
	U	0	111.33	
	U	5	117.33	
	U	50	114.33	
30	B	0	101.00	94.67
	B	5	71.67	97.67
	B	50	69.67	109.33
	U	0	101.00	94.67
	U	5	73.30	99.67
	U	50	74.30	110.33
31	B	0	77.33	81.67
	B	5	52.33	97.00

Table 11 (Continued)

Fabric	Bleached or Unbleached	Number of Washes	Mean Warp Tensile Strength	Mean Filling Tensile Strength
31	B	50	42.33	94.33
	U	0	77.33	81.67
	U	5	54.33	97.00
	U	50	47.33	91.67
32	B	0	35.00	88.00
	B	5	35.33	54.33
	B	50	36.67	27.67
	U	0	35.00	88.00
	U	5	36.33	62.33
	U	50	37.67	29.00
33	B	0	181.00	
	B	5	179.67	
	B	50	170.33	
	U	0	181.00	
	U	5	180.33	
	U	50	173.33	
34	B	0	177.00	
	B	5	189.67	
	B	50	187.00	
	U	0	177.00	
	U	5	189.67	
	U	50	187.00	

Note: All fabrics without a mean filling tensile strength are knit fabrics with the mean warp tensile strength representing bursting strength.

[a] All means are based on three observations.

Table 12

Means of Warp and Filling Tensile Strength

Over All Fabrics

Labeled or Unlabeled	Bleached or Unbleached	Number of Washes	N[a]	Mean Warp Tensile Strength	N	Mean Filling Tensile Strength
UL[b]	B[d]	0	30	99.00	15	63.47
UL	B	5	30	95.90	15	60.20
UL	B	50	30	91.97	15	55.67
UL	U[e]	0	33	93.12	18	57.50
UL	U	5	33	90.82	18	56.00
UL	U	50	33	88.36	18	50.00
L[c]	B	0	60	95.35	24	51.04
L	B	5	60	90.97	24	48.41
L	B	50	60	87.08	24	48.04
L	U	0	69	87.07	33	45.06
L	U	5	69	83.63	33	44.58
L	U	50	69	81.00	33	44.15

[a] N indicates number of observations.
[b] UL indicates unlabeled fabrics.
[c] L indicates labeled fabrics.
[d] B indicates bleached fabrics.
[e] U indicates unbleached fabrics.

APPENDIX D

ANALYSIS OF VARIANCE FOR PERFORMANCE TESTS

Table 13

Analysis of Variance for Color Transference

Over All Fabrics

Wet Color Transference

Source	DF	Sum of Squares	Mean Square	F Value	PR>F
M[a]	3	26.078	8.69	13.64	.0001
E[b]	199	126.820	.64		
CT[c]	202	152.89			
L[d]	1	22.7		35.62	.0001

Dry Color Transference

Source	DF	Sum of Squares	Mean Square	F Value	PR>F
M	3	.022	.0072	1.99	.1150
E	199	.72	.0036		
CT	202	.74			
L	1	.0053		1.46	.2284

Note. Model includes effect of label instructions.

[a] M indicates model.
[b] E indicates error.
[c] CT indicates corrected total.
[d] L indicates effect of label instructions.

Table 14

Analysis of Variance for Color Change

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
1	M[a]	7	12.0	1.71	.42	.8787
	E[b]	16	66.0	4.13		
	CT[c]	23	78.0			
	B[d]	1	.17		.04	.8432
2	M	7	745.83	106.55	34.1	.0001
	E	16	50.0	3.13		
	CT	23	795.83			
	B	1	416.67		133.33	.0001
6	M	7	3800.0	542.86	104.23	.0001
	E	16	83.33	5.21		
	CT	23	3883.33			
	B	1	337.5		64.8	.0001
9	M	7	6816.67	973.81	467.43	.0001
	E	16	33.33	2.08		
	CT	23	6850.0			
	B	1	3504.17		1682.0	.0001
10	M	7	1607.29	229.61	44.09	.0001
	E	16	83.33	5.21		
	CT	23	1690.63			
	B	1	651.04		125.0	.0001

Table 14 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
13	M	7	2198.96	314.14	100.52	.0001
	E	16	50.0	3.13		
	CT	23	2248.96			
	B	1	1276.04		408.33	.0001
14	M	7	1407.29	201.04	38.6	.0001
	E	16	83.33	5.21		
	CT	23	1490.63			
	B	1	51.04		9.8	.0065
15	M	7	1816.67	259.52	249.14	.0001
	E	16	16.67	1.04		
	CT	23	1833.33			
	B	1	704.17		676.0	.0001
16	M	7	7.29	1.04	1.0	.4663
	E	16	16.67	1.04		
	CT	23	23.96			
	B	1	1.04		1.0	.3322
17	M	7	957.29	136.76	32.82	.0001
	E	16	66.67	4.17		
	CT	23	1023.96			
	B	1	84.38		20.25	.0004

Table 14 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
18	M	7	7.29	1.04	1.00	.4663
	E	16	16.67	1.04		
	CT	23	23.96			
	B	1	1.04		1.00	.3322
19	M	7	7.29	1.04	1.0	.4663
	E	16	16.67	1.04		
	CT	23	23.96			
	B	1	1.04		1.00	.3322
20	M	7	29.17	4.17	1.00	.4663
	E	16	66.67	4.17		
	CT	23	95.83			
	B	1	4.17		1.00	.3322
21	M	7	3179.17	454.17	218.0	.0001
	E	16	33.33	2.08		
	CT	23	3212.5			
	B	1	266.67		128.00	.0001
22	M	7	3240.63	462.95	88.89	.0001
	E	16	83.33	5.21		
	CT	23	3323.96			
	B	1	2501.04		480.2	.0001
23	M	7	315.63	45.09	8.66	.0002
	E	16	83.33	5.21		
	CT	23	398.96			

Table 14 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
23	B	1	9.38		1.8	.1984
25	M	7	5595.83	799.40	255.81	.0001
	E	16	50.0	3.13		
	CT	23	5645.83			
	B	1	16.67		5.33	.0346
26	M	7	2582.29	368.9	50.59	.0001
	E	16	116.67	7.29		
	CT	23	2698.96			
	B	1	459.38		63.00	.0001
27	M	7	3040.63	434.38	83.4	.0001
	E	16	83.33	5.21		
	CT	23	3123.96			
	B	1	26.04		5.0	.0399
28	M	7	865.63	123.66	59.36	.0001
	E	16	33.33	2.08		
	CT	23	898.96			
	B	1	9.38		4.5	.0499
29	M	7	3895.83	556.55	133.57	.0001
	E	16	66.67	4.17		
	CT	23	3962.5			
	B	1	4.17		1.00	.3322

Table 14 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
30	M	7	3979.17	568.45	545.71	.0001
	E	16	16.67	1.04		
	CT	23	3995.83			
	B	1	3504.17		3364.0	.0001
31	M	7	3479.17	497.02	119.29	.0001
	E	16	66.67	4.17		
	CT	23	3545.83			
	B	1	1666.67		400.0	.0001
32	M	7	773.96	110.57	35.38	.0001
	E	16	50.0	3.13		
	CT	23	823.96			
33	M	7	5573.96	796.28	127.4	.0001
	E	16	100.0	6.25		
	CT	23	5673.96			
	B	1	1.04		.17	.6885
34	M	7	2900.0	414.29	75.54	.0001
	E	16	83.33	5.21		
	CT	23	2983.33			
	B	1	816.67		156.8	.0001
1 - 34	M	15	54349.59	3623.31	42.89	.0001
	E	752	63523.16	84.47		
	CT	767	117872.74			

Table 14 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
1 - 34	B	1	8202.35		97.1	.0001
	L[e]	1	19987.49		236.62	.0001
	B*[f]L	1	252.06		2.98	.085

Note. For individual fabrics the model consists of the effect of bleach. Over all fabrics, the model also includes the effect of label instructions and the interaction of bleaching with labeling.

Note. Fabrics not listed in the table showed no variance among observations due to bleach.

[a] M indicates model.
[b] E indicates error.
[c] CT indicates corrected total.
[d] B indicates effect of bleach.
[e] L indicates effect of label instructions.
[f] * indicates interaction between variables.

Table 15

Analysis of Variance for Appearance

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
1	M[a]	7	2.625	.375	3.0	.0326
	E[b]	16	2.00	.125		
	CT[c]	23	4.625			
	B[d]	1	.042		.33	.5717
2	M	7	1.958	.280	1.68	.1848
	E	16	2.667	.167		
	CT	23	4.625			
	B	1	.375		2.25	.1531
19	M	7	11.167	1.595	38.29	.0001
	E	16	0.667	.042		
	CT	23	11.833			
	B	1	.667		16.0	.0010
20	M	7	5.292	.756	18.14	.0001
	E	16	.667	.042		
	CT	23	5.958			
	B	1	1.042		25.0	.0001
23	M	7	9.167	1.310	4.49	.0061
	E	16	4.667	.29		
	CT	23	13.833			
	B	1	.167		.57	.4607

Table 15 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
25	M	7	2.958	.423	3.38	.0207
	E	16	2.0	.125		
	CT	23	4.958			
	B	1	1.042		8.33	.0107
26	M	7	1.292	.185	2.21	.0891
	E	16	1.333	.083		
	CT	23	2.625			
	B	1	.375		4.5	.0499
27	M	7	1.167	.167	1.00	.4663
	E	16	2.667	.167		
	CT	23	3.833			
	B	1	.167		1.00	.3322
29	M	7	.958	.137	1.10	.4113
	E	16	2.00	.125		
	CT	23	2.958			
	B	1	.042		.33	.5717
30	M	7	25.292	3.613	21.68	.0001
	E	16	2.667	.167		
	CT	23	27.958			
	B	1	.375		2.25	.1531
31	M	7	11.167	1.595	38.29	.0001
	E	16	.667	.042		
	CT	23	11.833			
	B	1	.667		16.0	.0010

Table 15 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
33	M	7	5.167	.738	17.71	.0001
	E	16	.667	.042		
	CT	23	5.833			
	B	1	.667		16.0	.0010
34	M	7	1.292	0.185	2.21	.0891
	E	16	1.333	0.083		
	CT	23	2.625			
	B	1	0.042		.50	.4897
1 - 34	M	15	145.51	9.70	11.21	.0001
	E	752	650.64	.87		
	CT	767	796.15			
	B	1	.19		.22	.6359
	L[e]	1	141.54		163.59	.0001
	B*[f]L	1	.015		.02	.8970

Note. For individual fabrics the model consists of the effect of bleach. Over all fabrics the model also includes the effect of label instructions, and the interaction of bleaching with labeling.

Note. Fabrics not listed in the table showed no variance among observations due to bleach.

[a] M indicates model.
[b] E indicates error.
[c] CT indicates corrected total.
[d] B indicates effect of bleach.
[e] L indicates effect of label instructions.
[f] * indicates interaction among variables.

Table 16

Analysis of Variance for Percent Change

in Warp Dimensional Stability

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
1	M[a]	11	.0065	.00059	77.62	.0001
	E[b]	12	.000091	.0000076		
	CT[c]	23	.0066			
	B[d]	1	.000024		3.43	.1377
	W[e]	3	.0064		280.55	.0001
	B*[f]W	3	.000041		1.78	.2042
2	M	11	.0011	.000099	4.93	.0001
	E	12	.000025	.0000021		
	CT	23	.0011			
	B	1	.000096		100.17	.0006
	W	3	.00094		150.68	.0001
	B*W	3	.000056		8.97	.0002
3	M	5	.00005	.000010	7.72	.0136
	E	6	.0000078	.0000013		
	CT	11	.000058			
	W	3	.000031		7.89	.0166
4	M	5	.000071	.000014	3.72	.0703
	E	6	.000023	.0000038		
	CT	11	.000094			
	W	3	.000066		5.75	.0337
5	M	5	.000018	.0000036	1.7	.2679
	E	6	.000013	.0000021		
	CT	11	.000031			
	W	3	.000018		.12	.8917

Table 16 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
6	M	11	.00049	.000044	5.93	.0023
	E	12	.00009	.0000075		
	CT	23	.00058			
	B	1	.000024		1.23	.3290
	W	3	.00034		15.22	.0002
	B*W	3	.000044		1.97	.1729
7	M	11	.0031	.00028	123.33	.0001
	E	12	.000027	.0000023		
	CT	23	.0031			
	B	1	.00000067		.09	.7793
	W	3	.003		444.59	.0001
	B*W	3	.000021		3.11	.0667
8	M	11	.0019	.00017	34.24	.0001
	E	12	.000061	.000005		
	CT	23	.002			
	B	1	.000088		19.41	.0116
	W	3	.0018		116.63	.0001
	B*W	3	.000029		1.88	.1861
9	M	11	.0015	.00014	115.13	.0001
	E	12	.000015	.0000012		
	CT	23	.0016			
	B	1	.00006		18.05	.0132
	W	3	.0013		365.32	.0001
	B*W	3	.00013		36.77	.0001
10	M	11	.011	.00099	249.2	.0001
	E	12	.000048	.000004		
	CT	23	.011			
	B	1	.0004		55.51	.0017
	W	3	.0103		864.07	.0001
	B*W	3	.00016		13.78	.0003

Table 16 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
11	M	11	.00086	.000079	28.88	.0001
	E	12	.000033	.0000027		
	CT	23	.0009			
	B	1	.0000042		.43	.5473
	W	3	.00076		88.94	.0001
	B*W	3	.000096		11.69	.0007
12	M	11	.0025	.00023	54.46	.0001
	E	12	.000051	.0000042		
	CT	23	.0026			
	B	1	.00034		84.37	.0008
	W	3	.0021		168.50	.0001
	B*W	3	.000042		3.28	.0587
13	M	11	.0024	.00021	415.93	.0001
	E	12	.0000062	.00000051		
	CT	23	.0024			
	B	1	.000048		17.25	.0142
	W	3	.0021		1384.00	.0001
	B*W	3	.00016		102.59	.001
14	M	11	.00041	.000038	5.72	.0028
	E	12	.000079	.0000066		
	CT	23	.00049			
	B	1	.00000017		.03	.8786
	W	3	.00033		16.79	.0001
	B*W	3	.000057		2.88	.0798
15	M	11	.00021	.000019	11.62	.0001
	E	12	.000019	.0000016		
	CT	23	.00023			
	B	1	.000011		.84	.4107
	W	3	.00014		28.21	.0001
	B*W	3	.0000083		1.72	.2151

Table 16 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
16	M	11	.0042	.00038	89.21	.0001
	E	12	.000051	.0000043		
	CT	23	.0042			
	B	1	.000043		36.57	.0038
	W	3	.0041		320.68	.0001
	B*W	3	.000035		2.75	.0886
17	M	11	.002	.00018	46.95	.0001
	E	12	.000047	.0000039		
	CT	23	.0021			
	B	1	.00007		17.88	.0134
	W	3	.0019		164.24	.0001
	B*W	3	.0000075		.63	.6068
18	M	11	.0031	.000029	11.53	.0001
	E	12	.00003	.0000025		
	CT	23	.00034			
	B	1	.000074		8.56	.0430
	W	3	.00014		19.06	.0001
	B*W	3	.000065		8.70	.0024
19	M	11	.0008	.000072	30.16	.0001
	E	12	.000029	.0000024		
	CT	23	.00083			
	B	1	.0000034		.98	.3791
	W	3	.00075		103.88	.0001
	B*W	3	.000031		4.32	.0278
20	M	11	.00095	.000087	115.75	.0001
	E	12	.000009	.00000075		
	CT	23	.00096			
	B	1	.000001		.36	.5823
	W	3	.00093		415.17	.0001
	B*W	3	.0000081		3.61	.0457

Table 16 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
21	M	11	.0039	.000035	16.32	.0001
	E	12	.000026	.0000022		
	CT	23	.00041			
	B	1	.000005		1.08	.3573
	W	3	.00036		54.74	.0001
	B*W	3	.0000095		1.46	.2759
22	M	11	.00049	.000045	24.27	.0001
	E	12	.000022	.0000019		
	CT	23	.00052			
	B	1	.0000082		2.93	.1624
	W	3	.00045		80.66	.0001
	B*W	3	.000027		4.84	.0196
23	M	11	.001	.000094	54.41	.0001
	E	12	.000021	.0000017		
	CT	23	.0011			
	B	1	.000035		3.77	.1241
	W	3	.00096		184.09	.0001
	B*W	3	.0000081		1.56	.2502
24	M	5	.0067	.0013	123.53	.0001
	E	6	.000065	.000011		
	CT	11	.0068			
	W	2	.0000047		.21	.8130
25	M	11	.0077	.0007	160.17	.0001
	E	12	.000052	.0000044		
	CT	23	.0077			
	B	1	.000045		17.29	.0142
	W	3	.0075		572.64	.0001
	B*W	3	.00014		10.39	.0012

Table 16 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
26	M	11	.0043	.00039	144.92	.0001
	E	12	.000032	.0000027		
	CT	23	.0043			
	B	1	.00000037		.16	.7090
	W	3	.0042		525.60	.0001
	B*W	3	.000036		4.56	.0237
27	M	11	.0038	.00034	51.84	.0001
	E	12	.00008	.0000066		
	CT	23	.0039			
	B	1	.000043		2.96	.1605
	W	3	.0036		181.24	.0001
	B*W	3	.000076		3.80	.0399
28	M	11	.00069	.000063	20.47	.0001
	E	12	.000037	.0000031		
	CT	23	.00073			
	B	1	.000038		10.84	.0301
	W	3	.0006		65.25	.0001
	B*W	3	.000039		4.22	.0297
29	M	11	.0036	.00032	93.78	.0001
	E	12	.000041	.0000034		
	CT	23	.0036			
	B	1	.0016		186.25	.0002
	W	3	.0018		178.46	.0001
	B*W	3	.00012		11.98	.0006
30	M	11	.0075	.00068	63.52	.0001
	E	12	.00013	.000011		
	CT	23	.0076			
	B	1	.000038		11.25	.0285
	W	3	.0072		224.53	.0001
	B*W	3	.00022		6.8	.0063

Table 16 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
31	M	11	.0091	.00082	209.60	.0001
	E	12	.000047	.0000039		
	CT	23	.0091			
	B	1	.0000082		.42	.5532
	W	3	.009		760.85	.0001
	B*W	3	.0000042		.35	.7876
32	M	11	.0011	.0001	25.26	.0001
	E	12	.000049	.0000041		
	CT	23	.0012			
	B	1	.000015		4.20	.1098
	W	3	.001		84.42	.0001
	B*W	3	.000071		5.81	.0109
33	M	11	.00057	.000042	15.97	.0001
	E	12	.000039	.0000032		
	CT	23	.00061			
	B	1	.000038		19.15	.0119
	W	3	.00049		51.23	.0001
	B*W	3	.000026		2.66	.0955
34	M	11	.007	.00073	101.23	.0001
	E	12	.000086	.0000072		
	CT	23	.0081			
	B	1	.000063		6.44	.0641
	W	3	.0078		364.52	.0001
	B*W	3	.00004		1.87	.1891
1 - 34	M	23	.44	.019	11.79	.0001
	E	744	1.19	.0016		
	CT	767	1.63			
	B	1	.00063		85.23	.0001
	W	3	.042		8.65	.0001
	L^g	1	.39		53597.68	.0001
	B*W	3	.000037		.01	.9963

Table 16 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
1 - 34	L*B	1	.00027		37.62	.0003
	L*W	3	.001		.21	.8851
	L*B*W	3	.00012		.02	.9904

Note. For individual fabrics the model includes the effect of bleach, the effect of number of washings, and the interaction of bleach with wash number. Over all fabrics the model also includes the effect of label instructions, the interaction of labeling with bleaching, labeling with wash number and labeling with bleaching with wash number.

[a] M indicates model.
[b] E indicates error.
[c] CT indicates corrected total.
[d] B indicates effect of bleach.
[e] W indicates effect of number of washings.
[f] * indicates interaction between variables.
[g] L indicates effect of label instructions.

Table 17

Analysis of Variance for Percent Change in

Filling Dimensional Stability

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
1	M[a]	11	.00064	.000058	12.82	.0001
	E[b]	12	.000054	.0000045		
	CT[c]	23	.00069			
	B[d]	1	.000006		6.0	.0705
	W[e]	3	.00052		38.68	.0001
	B*[f]W	3	.0001		7.58	.0042
2	M	11	.00032	.000029	7.19	.0010
	E	12	.000049	.0000041		
	CT	23	.00037			
	B	1	.000035		17.89	.0134
	W	3	.00026		21.33	.0001
	B*W	3	.000018		1.51	.2617
3	M	5	.0000075	.0000015	1.38	.3480
	E	6	.0000065	.000001		
	CT	11	.000014			
	W	2	.0000015		.69	.5364
4	M	5	.000014	.0000027	3.89	.0644
	E	6	.0000042	.00000069		
	CT	11	.000018			
	W	2	.0000052		3.72	.0890

Table 17 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
5	M	5	.00012	.000024	10.13	.0069
	E	6	.000015	.0000024		
	CT	11	.00014			
	W	2	.0000082		1.69	.2618
6	M	11	.0135	.0012	481.63	.0001
	E	12	.000031	.0000025		
	CT	23	.0135			
	B	1	.00063		36.63	.0038
	W	3	.0125		1636.61	.0001
	B*W	3	.00029		37.66	.0001
7	M	11	.00071	.000064	25.56	.0001
	E	12	.00003	.0000025		
	CT	23	.00074			
	B	1	.00032		57.78	.0016
	W	3	.00034		45.28	.0001
	B*W	3	.000028		3.73	.0420
8	M	11	.003	.00027	72.24	.0001
	E	12	.000045	.0000037		
	CT	23	.003			
	B	1	.000024		1.93	.2375
	W	3	.0029		255.06	.0001
	B*W	3	.000036		3.24	.0603
9	M	11	.00018	.000017	2.61	.0569
	E	12	.000076	.0000064		
	CT	23	.00026			
	B	1	.000048		12.17	.0252
	W	3	.000086		4.51	.0244
	B*W	3	.000033		1.71	.2185

Table 17 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
10	M	11	.0063	.00057	235.97	.0001
	E	12	.000029	.0000024		
	CT	23	.0063			
	B	1	.00049		87.04	.0007
	W	3	.0057		792.90	.0001
	B*W	3	.000016		2.21	.1400
11	M	11	.0013	.00012	50.6	.0001
	E	12	.000028	.0000024		
	CT	23	.0013			
	B	1	.00013		86.43	.0007
	W	3	.0011		155.28	.0001
	B*W	3	.000081		11.52	.0008
12	M	11	.0013	.00012	38.54	.0001
	E	12	.000038	.0000032		
	CT	23	.0014			
	B	1	.00000004		.01	.9420
	W	3	.0013		136.19	.0001
	B*W	3	.000021		2.21	.1392
13	M	11	.00091	.000083	51.35	.0001
	E	12	.000019	.0000016		
	CT	23	.00093			
	B	1	.000017		14.29	.0194
	W	3	.00088		182.55	.0001
	B*W	3	.0000063		1.31	.3164
14	M	11	.00049	.000044	35.56	.0001
	E	12	.000015	.0000013		
	CT	23	.0005			
	B	1	.000015		5.16	.0856
	W	3	.00045		119.77	.0001
	B*W	3	.000013		3.50	.0496

Table 17 (Continued)

Fabric	Source	DF	Sum of Square	Mean Square	F Value	PR>F
15	M	11	.0034	.0003	39.26	.0001
	E	12	.000091	.0000076		
	CT	23	.0034			
	B	1	.000001		.09	.7769
	W	3	.0032		141.68	.0001
	B*W	3	.0000051		.23	.8764
16	M	11	.0026	.00024	99.85	.0001
	E	12	.000029	.0000024		
	CT	23	.0027			
	B	1	.00012		3.74	.1252
	W	3	.0022		308.46	.0001
	B*W	3	.00017		24.06	.0001
17	M	11	.0025	.00023	52.93	.0001
	E	12	.000051	.0000042		
	CT	23	.0025			
	B	1	.000038		112.50	.0004
	W	3	.0024		188.48	.0001
	B*W	3	.000033		2.56	.1040
18	M	11	.0014	.00013	44.27	.0001
	E	12	.000035	.0000029		
	CT	23	.0014			
	B	1	.000002		1.11	.3508
	W	3	.0014		158.32	.0001
	B*W	3	.000025		2.94	.0764
19	M	11	.0011	.000096	22.09	.0001
	E	12	.000052	.0000044		
	CT	23	.0011			
	B	1	.000057		23.2	.0085
	W	3	.00096		73.65	.0001
	B*W	3	.000029		2.23	.1369

Table 17 (Continued)

Fabric	Source	DF	Sum of Square	Mean Square	F Value	PR>F
20	M	11	.000032	.0000029	3.87	.0140
	E	12	.000009	.00000075		
	CT	23	.000041			
	B	1	.000001		2.5	.1890
	W	3	.000029		12.94	.0005
	B*W	3	.00000013		.06	.9820
21	M	11	.0045	.00041	101.86	.0001
	E	12	.000049	.000004		
	CT	23	.0046			
	B	1	.000026		3.63	.1293
	W	3	.0045		368.56	.0001
	B*W	3	.0000055		.45	.7228
22	M	11	.00021	.000019	9.6	.0002
	E	12	.000024	.000002		
	CT	23	.00023			
	B	1	.0000082		5.76	.0743
	W	3	.00019		32.14	.0001
	B*W	3	.0000042		.70	.5676
23	M	11	.0026	.00024	90.50	.0001
	E	12	.000032	.0000026		
	CT	23	.0027			
	B	1	.0000034		.50	.5185
	W	3	.0024		305.19	.0001
	B*W	3	.00018		22.79	.0001
24	M	5	.014	.0027	566.50	.0001
	E	6	.000029	.0000048		
	CT	11	.014			
	W	3	.014		943.95	.0001

Table 17 (Continued)

Fabric	Source	DF	Sum of Square	Mean Square	F Value	PR>F
25	M	11	.0011	.000097	30.46	.0001
	E	12	.000038	.0000032		
	CT	23	.0011			
	B	1	.000005		3.90	.1194
	W	3	.00096		100.28	.0001
	B*W	3	.000099		10.35	.0012
26	M	11	.039	.0036	409.93	.0001
	E	12	.0001	.0000087		
	CT	23	.039			
	B	1	.0012		147.45	.0003
	W	3	.036		1389.34	.0001
	B*W	3	.0017		66.16	.0001
27	M	11	.0064	.00058	86.93	.0001
	E	12	.000081	.0000067		
	CT	23	.0064			
	B	1	.00004		10.92	.0298
	W	3	.0062		307.36	.0001
	B*W	3	.00018		8.68	.0025
28	M	11	.00038	.000035	21.47	.0001
	E	12	.00002	.0000016		
	CT	23	.0004			
	B	1	.0001		45.45	.0025
	W	3	.00018		37.81	.0001
	B*W	3	.000086		17.68	.0001
29	M	11	.026	.0024	289.91	.0001
	E	12	.000099	.0000082		
	CT	23	.026			
	B	1	.0047		545.39	.0001
	W	3	.021		849.34	.0001
	B*W	3	.00054		21.9	.0001

Table 17 (Continued)

Fabric	Source	DF	Sum of Square	Mean Square	F Value	PR>F
30	M	11	.00032	.000029	7.48	.0008
	E	12	.000047	.0000039		
	CT	23	.00037			
	B	1	.000092		24.27	.0079
	W	3	.00016		13.62	.0004
	B*W	3	.000054		4.65	.0222
31	M	11	.0095	.00087	67.93	.0001
	E	12	.00015	.000013		
	CT	23	.0097			
	B	1	.000033		1.7	.2617
	W	3	.0094		245.74	.0001
	B*W	3	.000019		.50	.6921
32	M	11	.038	.0035	948.42	.0001
	E	12	.000044	.0000036		
	CT	23	.038			
	B	1	.00059		74.53	.0010
	W	3	.037		3389.81	.0001
	B*W	3	.00034		30.79	.0001
33	M	11	.0029	.00026	73.81	.0001
	E	12	.000043	.0000038		
	CT	23	.0029			
	B	1	.00039		140.43	.0003
	W	3	.0024		228.37	.0001
	B*W	3	.000049		4.62	.0227
34	M	11	.00029	.000026	11.04	.0001
	E	12	.000028	.0000024		
	CT	23	.00031			
	B	1	.00017		132.13	.0003
	W	3	.000042		5.92	.0102
	B*W	3	.000068		9.61	.0016

Table 17 (Continued)

Fabric	Source	DF	Sum of Square	Mean Square	F Value	PR>F
1 - 34	M	23	.17	.0072	5.57	.0001
	E	744	.97	.0013		
	CT	767	1.13			
	B	1	.0013		127.19	.0001
	W	3	.087		22.19	.0001
	L[g]	1	.077		7253.69	.0001
	B*W	3	.00016		.04	.9832
	L*B	1	.0000077		.73	.4183
	L*W	3	.016		4.07	.0072
	L*B*W	3	.000054		.01	.9941

Note. For individual fabrics the model includes the effect of bleach, the effect of number of washes, and the interaction of bleach with wash number. Over all fabrics the model also includes the effect of label instructions, the interaction of labeling with bleaching, labeling with wash number and labeling with bleaching with wash number.

[a] M indicates model.
[b] E indicates error.
[c] CT indicates corrected total.
[d] B indicates effect of bleach.
[e] W indicates effect of number of washings.
[f] * indicates interaction between variables.
[g] L indicates effect of label instructions.

Table 18

Analysis of Variance for Warp Tensile Strength

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
1	M[a]	5	138.44	27.69	6.23	.0045
	E[b]	12	53.33	4.44		
	CT[c]	17	191.78			
	B[d]	1	18.0		4.05	.0672
	W[e]	2	108.44		12.20	.0013
	B*[f]W	2	12.0		1.35	.2959
2	M	5	74.27	14.85	.62	.6902
	E	12	289.33	24.1		
	CT	17	363.61			
	B	1	1.38		.06	.8144
	W	2	58.10		1.21	.3335
	B*W	2	14.78		.31	.7416
3	M	2	34.89	17.44	8.26	.0189
	E	6	12.67	2.11		
	CT	8	47.56			
	W	2	34.89		8.26	.0189
4	M	2	2.89	1.44	.68	.5399
	E	6	12.67	2.11		
	CT	8	15.56			
	W	2	2.89	1.44	.68	.5399
5	M	2	.67	.33	.06	.9455
	E	6	35.33	5.89		
	CT	8	36.0			
	W	2	.67		.06	.9455

Table 18 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
6	M	5	29.78	5.96	1.99	.1533
	E	12	36.00	3.0		
	CT	17	65.78			
	B	1	3.56		1.19	.2977
	W	2	24.78		4.13	.0432
	B*W	2	1.44		.24	.7898
7	M	5	134.28	26.86	21.97	.0001
	E	12	14.67	1.22		
	CT	17	148.94			
	B	1	4.5		3.68	.0791
	W	2	126.78		51.86	.0001
	B*W	2	3.0		1.23	.3274
8	M	5	834.0	166.8	100.08	.0001
	E	12	20.0	1.68		
	CT	17	854.0			
	B	1	10.89		6.53	.0252
	W	2	809.33		242.80	.0001
	B*W	2	13.78		4.13	.0431
9	M	5	80.67	16.13	3.26	.0433
	E	12	59.33	4.94		
	CT	17	140.00			
	B	1	10.89		2.20	.1636
	W	2	64.33		6.51	.0122
	B*W	2	5.44		.55	.5905
10	M	5	674.00	134.80	14.44	.0001
	E	12	112.00	9.33		
	CT	17	786.00			
	B	1	88.89		9.52	.0094
	W	2	484.33		25.95	.0001
	B*W	2	100.78	5.4	.0213	

Table 18 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
11	M	5	3.61	.72	.37	.8587
	E	12	23.33	1.94		
	CT	17	26.94			
	B	1	1.39		.71	.4146
	W	2	1.44		.37	.6974
	B*W	2	.78		.20	.8214
12	M	5	5501.11	1100.20	198.04	.0001
	E	12	66.67	5.56		
	CT	17	5567.78			
	B	1	5.56		1.00	.3370
	W	2	5489.78		494.08	.0001
	B*W	2	5.78		.52	.6073
13	M	5	52.94	10.59	1.60	.2331
	E	12	79.33	6.61		
	CT	17	132.28			
	B	1	2.72		.41	.5351
	W	2	18.78		1.42	.2795
	B*W	2	31.44		2.38	.1349
14	M	5	12.28	2.46	1.47	.2690
	E	12	20.00	1.67		
	CT	17	32.28			
	B	1	1.39		.83	.3793
	W	2	8.10		2.43	.1297
	B*W	2	2.78		.83	.4583
15	M	5	83.17	16.63	3.06	.0524
	E	12	65.33	5.44		
	CT	17	148.50			
	B	1	12.50		2.30	.1556
	W	2	60.33		5.54	.0197
	B*W	2	10.33		.95	.4144

Table 18 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
16	M	5	27.61	5.52	1.08	.4188
	E	12	61.33	5.11		
	CT	17	88.94			
	B	1	9.38		1.84	.2003
	W	2	11.44		1.12	.3583
	B*W	2	6.78		.66	.5332
17	M	5	76.44	15.29	4.66	.0135
	E	12	39.33	3.28		
	CT	17	115.78			
	B	1	3.56		1.08	.3182
	W	2	68.11		10.39	.0024
	B*W	2	4.78		.73	.5027
18	M	5	1.11	.22	.36	.8638
	E	12	7.33	.61		
	CT	17	8.44			
	B	1	.22		.36	.5577
	W	2	.44		.36	.7025
	B*W	2	.44		.36	.7025
19	M	5	145.78	29.16	6.64	.0035
	E	12	52.67	4.39		
	CT	17	198.44			
	B	1	.89		.20	.6607
	W	2	141.44		16.11	.0004
	B*W	2	3.44		.39	.6838
20	M	5	1672.28	334.46	26.88	.0001
	E	12	149.33	12.44		
	CT	17	1821.61			
	B	1	6.72		.54	.4765
	W	2	1661.44		66.75	.0001
	B*W	2	4.11		.17	.8496

Table 18 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
21	M	5	2.5	.5	.19	.9618
	E	12	32.0	2.67		
	CT	17	34.5			
	B	1	.06		.02	.8876
	W	2	2.33		.44	.6555
	B*W	2	.11		.02	.9794
22	M	5	855.11	171.02	16.46	.0001
	E	12	124.67	10.39		
	CT	17	979.78			
	B	1	26.89		2.59	.1336
	W	2	813.44		39.15	.0001
	B*W	2	14.78		.71	.5106
23	M	5	46.28	9.26	1.81	.1851
	E	12	61.33	5.11		
	CT	17	107.61			
	B	1	16.05		3.14	.1017
	W	2	20.11		1.97	.1824
	B*W	2	10.11		.99	.4003
24	M	2	32.89	16.44	4.48	.0644
	E	6	22.0	3.67		
	CT	8	54.89			
	W	2	32.89		4.48	.0644
25	M	5	125.78	25.16	11.61	.0003
	E	12	26.0	2.17		
	CT	17	151.78			
	B	1	3.56		1.64	.2244
	W	2	115.11		26.56	.0001
	B*W	2	7.11		1.64	.2344

Table 18 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
26	M	5	178.67	35.73	20.1	
	E	12	21.33	1.78		
	CT	17	200.00			
	B	1	0.00		.00	1.000
	W	2	170.33		47.91	.0001
	B*W	2	8.33		2.34	.1383
27	M	5	45.61	9.122	2.57	.0841
	E	12	42.67	3.56		
	CT	17	88.28			
	B	1	20.06		5.64	.0351
	W	2	13.44		1.89	.1933
	B*W	2	12.11		1.70	.2233
28	M	5	64.00	12.8	10.97	.0004
	E	12	14.00	1.17		
	CT	17	78.00			
	B	1	32.00		27.43	.0002
	W	2	13.00		5.57	.0194
	B*W	2	19.00		8.14	.0058
29	M	5	187.61	37.52	13.24	.0002
	E	12	34.00	2.83		
	CT	17	221.61			
	B	1	.05		.02	.8910
	W	2	168.78		29.78	.0001
	B*W	2	18.78		3.31	.0715
30	M	5	3343.83	668.77	104.68	.0001
	E	12	76.67	6.39		
	CT	17	3420.50			
	B	1	20.06		3.14	.1018
	W	2	3307.00		258.81	.0001
	B*W	2	16.78		1.31	.3050

Table 18 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
31	M	5	3452.50	690.50	94.16	.0001
	E	12	88.00	7.33		
	CT	17	3540.50			
	B	1	24.5		3.34	.0925
	W	2	3409.0		232.43	.0001
	B*W	2	19.0		1.30	.3095
32	M	5	17.33	3.47	6.24	.0045
	E	12	6.67	.56		
	CT	17	24.00			
	B	1	2.0		3.6	.0821
	W	2	14.33		12.9	.0010
	B*W	2	1.0		.9	.4323
33	M	5	317.61	63.52	33.63	.0001
	E	12	22.67	1.89		
	CT	17	340.28			
	B	1	6.72		3.56	.0837
	W	2	303.44		80.32	.0001
	B*W	2	7.44		1.97	.1820
34	M	5	535.11	107.02	24.08	.0001
	E	12	53.33	4.44		
	CT	17	588.44			
	B	1	0.00		0.00	1.000
	W	2	535.11		60.20	.0001
	B*W	2	0.00		0.00	1.000
1-34	M	11	14886.17	1353.29	.65	.7835
	E	564	1167498.47	2070.032		
	CT	575	1182384.64			
	B	1	4621.57		2.23	.1357
	W	2	3601.49		.87	.4196
	Lg	1	4079.13		1.97	.1609

Table 18 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
1 - 34	B*W	2	107.072		.03	.9745
	L*B	1	178.57		.09	.7691
	L*W	2	43.40		.01	.9896
	L*B*W	2	.29		.00	1.0000

Note. For individual fabrics the model includes the effect of bleach, the effect of number of washings, and the interaction of bleach with wash number. Over all fabrics the model also includes the effect of label instructions, the interaction of labeling with bleaching, labeling with wash number, and labeling with bleaching with wash number.

[a] M indicates model.
[b] E indicates error.
[c] CT indicates corrected total.
[d] B indicates effect of bleach.
[e] W indicates effect of number of washings.
[f] * indicates interaction between variables.
[g] L indicates effect of label instructions.

Table 19

Analysis of Variance for Filling Tensile Strength

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
1	M[a]	5	43.78	8.76	9.85	.0006
	E[b]	12	10.67	.89		
	CT[c]	17	54.44			
	B[d]	1	5.56		6.25	.0279
	W[e]	2	32.44		18.25	.0002
	B*[f]W	2	5.78		3.25	.0745
2	M	5	79.61	15.92	5.73	.0063
	E	12	33.33	2.78		
	CT	17	112.94			
	B	1	40.5		14.58	.0024
	W	2	18.78		3.38	.0685
	B*W	2	20.33		3.66	.0574
3	M	2	14.0	7.0	2.33	.1780
	E	6	18.0	3.0		
	CT	8	32.0			
	W	2	14.0		2.33	.1780
4	M	2	18.67	9.33	2.62	.1517
	E	6	21.33	3.56		
	CT	8	40.00			
	W	2	18.67		2.62	.1517
5	M	2	6.22	3.11	4.67	.0599
	E	6	4.00	.67		
	CT	8	10.22			
	W	2	6.22		4.67	.0599

Table 19 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
9	M	5	111.17	22.23	2.86	.0632
	E	12	93.33	7.78		
	CT	17	204.5			
	B	1	24.50		3.15	.1013
	W	2	74.33		4.78	.0298
	B*W	2	12.33		.79	.4749
13	M	5	31.78	6.36	2.38	.1011
	E	12	32.00	2.67		
	CT	17	63.78			
	B	1	.22		.08	.7778
	W	2	19.44		3.65	.0579
	B*W	2	12.11		2.27	.1458
14	M	5	15.33	3.07	2.91	.0604
	E	12	12.67	1.06		
	CT	17	28.00			
	B	1	2.00		1.89	.1938
	W	2	9.33		4.42	.0364
	B*W	2	4.00		1.89	.1927
19	M	5	134.94	26.99	1.12	.4020
	E	12	290.00	24.17		
	CT	17	424.94			
	B	1	84.50		3.50	.0861
	W	2	7.44		.15	.8589
	B*W	2	43.00		.89	.4362
20	M	5	84.67	16.93	2.50	.0900
	E	12	81.33	6.78		
	CT	17	166.00			
	B	1	.89		.13	.7235
	W	2	80.33		5.93	.0162
	B*W	2	3.44		.25	.7797

Table 19 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
23	M	5	20.44	4.09	.85	.5429
	E	12	58.00	4.83		
	CT	17	78.44			
	B	1	8.0		1.66	.2225
	W	2	3.11		.32	.7309
	B*W	2	9.33		.97	.4085
24	M	2	56.0	28.0	7.64	.0224
	E	6	22.0	3.67		
	CT	8	78.0			
	W	2	56.0		7.64	.0224
25	M	5	85.33	17.07	10.97	.0004
	E	12	18.67	1.56		
	CT	17	104.0			
	B	1	.89		.57	.4643
	W	2	84.00		27.00	.0001
	B*W	2	.44		.14	.8683
28	M	5	3.61	.72	2.17	.1265
	E	12	4.00	.33		
	CT	17	7.61			
	B	1	.50		1.50	.2442
	W	2	2.11		3.17	.0786
	B*W	2	1.0		1.5	.2621
30	M	5	748.94	149.79	11.38	.0003
	E	12	158.00	13.17		
	CT	17	906.94			
	B	1	4.50		.34	.5696
	W	2	741.40		28.16	.0001
	B*W	2	3.0		.11	.8933

Table 19 (Continued)

Fabric	Source	DF	Sum of Squares	Mean Square	F Value	PR>F
31	M	5	769.78	153.96	8.37	.0013
	E	12	220.67	18.39		
	CT	17	990.44			
	B	1	3.56		.19	.6680
	W	2	759.11		20.64	.0001
	B*W	2	7.11		.19	.8267
32	M	5	10779.11	2155.82	862.33	.0001
	E	12	30.00	2.50		
	CT	17	10809.11			
	B	1	43.56		17.42	.0013
	W	2	10680.44		2136.09	.0001
	B*W	2	55.11		11.02	.0019
1-34	M	11	9477.42	861.58	.84	.6048
	E	258	265809.90	1030.27		
	CT	269	275287.32			
	B	1	1498.40		1.45	.2289
	W	2	960.31		.47	.6280
	L[g]	1	6501.89		6.31	.0126
	B*W	2	39.96		.02	.9808
	L*B	1	7.72		.01	.9311
	L*W	2	390.079		.19	.8276
	L*B*W	2	9.19		0.00	.9955

Note. For individual fabrics the model includes the effect of bleach, the effect of number of washings and the interaction of bleach with wash number. Over all fabrics the model also includes the effect of label instructions, the interaction of labeling with bleaching, labeling with wash number and labeling with bleaching with wash number.

[a] M indicates model.
[b] E indicates error.
[c] CT indicates corrected total.
[d] B indicates the effect of bleach.
[e] W indicates the effect of number of washings.
[f] * indicates interaction between variables.
[g] L indicates the effect of label instructions.

APPENDIX E

WASH LEVELS AT WHICH FABRICS FAIL MINIMUM PERFORMANCE STANDARDS

Table 20

Wash Level by which Unbleached Fabrics

Fail Minimum Performance Standards

Fabric	WCT[a]	C[b]	A[c]	DSW[d]	DSF[e]	TSW[f]	TSF[g]
1				5			
2				20	1		
5		50		1			
6		20			50		
9		50		50			
10				20	1		
13				1	1		
14		20					
15		50					
17		50					
18	0						
21	0	20					
22		20					
23			50		5		
24			50	1	20		
25		5	1	1	50		
26	0	20			20		
27		20		1			
28		50					
29	0	20					
30		20	1	1			
31	0	5	5	1	1	50	
32	0			5	1		50
33		5					
34	0	50		5			

Note. Missing fabrics met minimum performance standards at all wash levels.

[a] WCT indicates wet color transference.
[b] C indicates color change.
[c] A indicates appearance.
[d] DSW indicates dimensional stability warp.
[e] DSF indicates dimensional stability filling.
[f] TSW indicates tensile strength warp.
[g] TSF indicates tensile strength filling.

Table 21

Wash Level by Which Bleached Fabrics

Fail Minimum Performance Standards

Fabric	C[a]	A[b]	DSW[c]	DSF[d]	TSW[e]	TSF[f]
1			5			
2	20		50	1		
6	5			50		
7						
8						
9	5		20			
10	20		5	1		
13	5			1		
14	20					
15	5					
17	50					
21	5					
22	1					
23		50		5		
24						
25	5	1	1	50		
26	1			20		
27	5		1			
28	50					
29	20			20		
30	1	1	1			
31	1	1	1	1	50	
32	50		5	1		5
33	5					
34	5		5			

Note. Missing fabrics met minimum performance standards at all wash levels.

[a] C indicates color change.
[b] A indicates appearance.
[c] DSW indicates dimensional stability warp.
[d] DSF indicates dimensional stability filling.
[e] TSW indicates tensile strength warp.
[f] TSF indicates tensile strength filling.