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CONSUMER PROBLEMS RELATED TO COLOR  
CHANGES IN TEXTILE PRODUCTS

by

Frances Ferrell Pollock

A Thesis Submitted to  
the Faculty of the Graduate School at  
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This study was designed to review the types and prevalence of problems of color change in textile products as they occurred in consumer use. Selected drycleaners and retailers were asked to report their observations of consumer complaints of color changes. Of particular interest were those color changes caused by perspiration, anti-perspirants and deodorants, and atmospheric contaminants or combinations of these factors. The study was made in cooperation with the National Institute of Drycleaning.

Color change data obtained from retailers were comparable to data obtained from drycleaners. Colors reported to be most often affected were: blue, green, red and violet. Fume fading was considered the major cause of complaints. Fibers most affected were: acetate, rayon, silk, wool and cotton. Dresses and blouses and the underarm area of garments were most affected by color damages. Draperies and curtains were the household textiles which were most often damaged by color changes. Retailers handled a greater variety of color change problems than did drycleaners.

Although problems of color change were considered moderately serious, they did not represent a large expenditure for adjustments when viewed in terms of percentage of annual business volume required to settle complaints.

Retailers thought color damages due to consumer use and/or misuse while drycleaners thought them due to the use of improper dyes by the manufacturer.

Drycleaners and retailers believed that there was a need for improvement in dyes and for additional consumer education. Better labeling of textile products by producers was seen as an effective means of educating the consumer as to the product's expected performance.

Laboratory analyses data were indicative of complaints received by drycleaners although not all drycleaners sent complaints to laboratories for analysis.

Some differences in types of color change complaints received by drycleaners could be noted when data were classified by geographic region or by the industrial status of locations of drycleaning establishments.

#### ACKNOWLEDGMENTS

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Dr. Dorothy S. Lyle, Director of Consumer Relations for the National Institute of Drycleaning, is acknowledged for her assistance in making this study possible.

## TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION . . . . .	1
Statement of the Problem . . . . .	1
Organization of the Study . . . . .	3
II. REVIEW OF THE LITERATURE. . . . .	5
Atmospheric Contaminants. . . . .	5
Definition of atmospheric fading. . . . .	5
Gas fading. . . . .	6
Effects on dyes and fibers. . . . .	7
Gas fading inhibitors . . . . .	9
Ozone fading. . . . .	10
Effects on dyes and fibers. . . . .	11
Relationship of ozone and smog. . . . .	12
Perspiration and Anti-perspirants . . . . .	13
Perspiration. . . . .	13
Effect of perspiration on fabrics and finishes. . . . .	14
Laboratory duplication of the effects of perspiration . . . . .	15
Deodorants and anti-perspirants . . . . .	16
Definition of deodorants and anti-perspirants. . . . .	16
Effects on textiles . . . . .	17

CHAPTER	PAGE
Drycleaning. . . . .	19
Definition of drycleaning. . . . .	19
Color changes associated with drycleaning process. . . . .	20
Damages occurring before drycleaning . . . .	20
Dyes not fast to drycleaning process . . . .	21
Consumer Complaints. . . . .	25
III. METHOD OF PROCEDURE . . . . .	35
Preparation of the Questionnaire . . . . .	35
Testing the effectiveness of the questionnaire. . . . .	36
Revision of the questionnaire . . . . .	37
Selection of drycleaners . . . . .	38
Selection of retail groups surveyed. . . . .	39
Mailing of the questionnaire . . . . .	41
Tabulation and evaluation. . . . .	42
IV. PRESENTATION OF DATA . . . . .	44
Description of Population Surveyed . . . . .	44
Response to questionnaires . . . . .	44
Response by drycleaners. . . . .	45
Response by retail groups. . . . .	46
Sources of information from drycleaners and retailers. . . . .	46
Location of cooperating groups . . . . .	48
Population of communities represented. . . .	48
Industrial status of communities represented	50



Consumer Problems and Methods of Adjusting Claims . . . . .	52
Methods of adjusting claims. . . . .	52
Consumer complaints related to textile products . . . . .	56
Color Changes in Textile Products. . . . .	58
Consumer complaints due to color changes . .	58
Average number and range . . . . .	58
Per cent of all consumer complaints. . . . .	60
Monetary adjustment of complaints due to color change . . . . .	63
Number adjusted. . . . .	63
Per cent of dollar volume. . . . .	65
Seriousness of color changes in textile products . . . . .	67
Most frequent causes of color changes. . . . .	69
Colors most affected by acid conditions. . . . .	72
Fibers most affected by color changes due to acid conditions . . . . .	75
Parts of garments most affected by color changes . . . . .	79
Garments most frequently affected by color changes. . . . .	81
Household textile articles most affected by color changes . . . . .	84
Causes of color changes in textile products. .	88

CHAPTER	PAGE
Consumer Education . . . . .	91
Effectiveness of additional consumer education. . . . .	91
Consumer education methods . . . . .	91
V. SUMMARY AND CONCLUSIONS. . . . .	99
Summary. . . . .	99
Conclusions. . . . .	107
Recommendations for Further Study. . . . .	108
BIBLIOGRAPHY . . . . .	109
APPENDIX A. Survey Questionnaire. . . . .	112
APPENDIX B. Cover Letter For Survey Questionnaire . . .	115
APPENDIX C. Tables Indicating Number and Location of Drycleaning Establishments by Regions . . . . .	116
APPENDIX D. Tables Indicating Responses of Drycleaning Establishments Accord- ing to Industrial Status and Location . .	120

LIST OF TABLES

TABLE		PAGE
I.	Garments Involved in Customer Complaints . . . .	32
II.	Principal Fibers Involved in Customer Complaints from Reports of Analyses Made at Mellon Institute 1935-1953 . . . . .	33
III.	Sources of the Information . . . . .	47
IV.	Population of Cities in Which Surveyed Drycleaning Establishments and Retail Groups Were Located . . . . .	49
V.	Industrial Status of Cities in Which Drycleaning Establishments and Retail Groups Were Located . . . . .	51
VI.	Methods of Claim Adjustment. . . . .	53
VII.	Consumer Complaints Related to Wearing Apparel and Household Textiles . . . . .	57
VIII.	Consumer Complaints Due to Color Changes . . . .	59
IX.	Consumer Complaints Due to Color Change in Textile Products . . . . .	62
X.	Consumer Complaints Due to Color Change Which Required Monetary Adjustment . . . . .	64
XI.	Annual Business Volume Needed to Make Monetary Adjustments for Damages Due to Color Changes . . . . .	66

TABLE	PAGE
XII.	Degree of Seriousness Attributed to the Problem of Color Change. . . . . 68
XIII.	Factors Most Frequently Causing Complaints Regarding Color Changes in Textile Products . 70
XIV.	Colors Reported to be Most Affected by Acid Conditions. . . . . 76
XV.	Fibers Reported to be Most Affected by Color Changes Due to Acid Conditions . . . . . 76
XVI.	Parts of Garments Reported to be Most Affected by Color Changes . . . . . 80
XVII.	Garments Reported to be Most Frequently Affected by Color Changes. . . . . 82
XVIII.	Household Textile Articles Reported to be Most Affected by Color Changes. . . . . 85
XIX.	Reported Causes of Color Changes in Textile Products . . . . . 89
XX.	Usefulness of Additional Consumer Education in Effecting a Decrease in the Number of Color Change Complaints. . . . . 92
XXI.	Effective Methods of Educating Consumers Regarding Color Change Problems. . . . . 93
XXII.	Number and Location of Drycleaning Establish- ments Responding to the Questionnaire from the North Central Region . . . . . 116
XXIII.	Number and Location of Drycleaning Establish- ments Responding to the Questionnaire from the Northeastern Region . . . . . 117

TABLE	PAGE
XXIV. Number and Location of Drycleaning Establishments Responding to the Questionnaire from the Southern Region . . . . .	118
XXV. Number and Location of Drycleaning Establishments Responding to the Questionnaire from the Western Region . . . . .	119
XXVI. Population of Cities (According to industrial status of location of drycleaning establishments) . . . . .	120
XXVII. Methods of Claim Adjustment (According to industrial status of location of drycleaning establishments). . . . .	121
XXVIII. Consumer Complaints Due to Color Change in Textile Products (According to industrial status of location of drycleaning establishments). . . . .	122
XXIX. Consumer Complaints Due to Color Change Which Required Monetary Adjustment (According to industrial status of location of drycleaning establishments) . . . . .	123
XXX. Annual Business Volume Needed to Make Monetary Adjustments for Damages Due to Color Changes (According to industrial status of location of drycleaning establishments). . . . .	124
XXXI. Degree of Seriousness Attributed to the Problem of Color Change (According to industrial status of location of drycleaning establishments). . .	125

TABLE	PAGE
XXXII. Factors Most Frequently Causing Complaints Regarding Changes in Textile Products (According to industrial status of location of drycleaning establishments) . . .	126
XXXIII. Colors Reported to be Most Affected by Acid Conditions (According to industrial status of location of drycleaning establishments) . . . . .	127
XXXIV. Fibers Most Affected by Color Change Due to Acid Conditions (According to industrial status of location of drycleaning establishments) . . . . .	128
XXXV. Parts of Garments Most Affected by Color Changes (According to industrial status of location of drycleaning establishments). .	129
XXXVI. Garments Reported to be Most Frequently Affected by Color Changes (According to industrial status of location of drycleaning establishments) . . . . .	130
XXXVII. Household Textile Articles Reported to be Most Affected by Color Changes (According to industrial status of location of drycleaning establishments) . . . . .	131

TABLE	PAGE
XXXVIII. Reported Causes of Color Changes in Textile Products (According to industrial status of location of drycleaning establishments) . . . . .	132
XXXIX. Usefulness of Additional Consumer Education in Effecting a Decrease in the Number of Color Change Complaints Received (According to industrial status of drycleaning establishments) . . . . .	133

## CHAPTER I

### INTRODUCTION

#### I. STATEMENT OF THE PROBLEM

Household textiles and apparel are often limited in serviceability by color changes. Although the damaged product may be little affected in size, form, strength, texture or hand of the fabric, a slight color change could render the product unfit for its intended use. There are many factors which may effect color changes on textile products. In many instances color changes remain unnoticed until the textile product is laundered or drycleaned.<sup>1</sup> The color change then becomes a problem not only to the consumer but also to retailers and service industries. These groups are often expected to provide an acceptable payment for damages sustained or to provide convincing evidence that they should not be held responsible for the damage.

Laboratory analysis is frequently necessary as a means of determining the cause of damage and suggesting the correct settlement of the claim. Such services may be obtained from (1) laboratories maintained by retail groups, (2) those maintained by the service industries such as the

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<sup>1</sup>Dorothy Siegert Lyle, Focus On Fabrics (Silver Spring: National Institute of Drycleaning, 1958, p. 387.



American Institute of Laundering and the National Institute of Drycleaning, (3) laboratories of textile manufacturing firms and (4) laboratories independent of commercial sponsorship. However, many problems are not sent to laboratories for analysis or otherwise reported. "Many laboratories report they see but a fraction of the complaints that are handled by their own organization because actual laboratory analysis is needed only in disputes."<sup>2</sup>

This study was planned to secure information about the actual types and prevalence of complaints due to color changes in textile products which might be caused by perspiration, anti-perspirants, atmospheric contaminants and by combinations of these factors. There has been extensive research on the effects of atmospheric contaminants on various dyes, fibers, and combinations of dyes and fibers. Little research is reported concerning the effects of perspiration or anti-perspirants in relation to color changes on textiles. Still less information is available pertaining to the problems of fabric damage caused by the effects of these three factors on textile products in actual use.

Reports from the National Institute of Drycleaning indicate the existence of cases of fabric damage from exposure to these acid substances and publicize periodically the number of such complaints sent to their analysis

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<sup>2</sup>Albert E. Johnson, "Can Claims Adjusting be Standardized?," The American Dyestuff Reporter, LI (July 9, 1962), 517.

department. Other laboratories interested in the performance of textile products have also indicated problems of this nature occurring in consumer use.

It has been observed that "the kinds of complaints handled by laboratories are not representative of total consumer experience."<sup>3</sup> This may be true also of the complaints handled by department stores or by drycleaners that are not further subjected to laboratory analysis. In this study it was assumed that information secured from the source where complaints were originally registered might be more representative of consumer experience than laboratory data could indicate.

The study was conducted independently but with the approval and cooperation of the National Institute of Drycleaning.

## II. ORGANIZATION OF THE STUDY

Chapter II is a review of the literature pertaining to the influence of perspiration, anti-perspirants and atmospheric contaminants on color changes in textile products and the problems of color change as they are related to consumer use. Chapter III outlines the procedure for (1) the preparation of the questionnaire, (2) the selection of drycleaners surveyed, (3) the

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<sup>3</sup>Ibid.

selection of retail groups surveyed, (4) the mailing of the questionnaire and (5) the tabulation and evaluation of questionnaire data. The summary, conclusions and recommendations for further study are included in Chapter V.

## CHAPTER II

### REVIEW OF LITERATURE

#### I. ATMOSPHERIC CONTAMINANTS

##### Definition of Atmospheric Fading

Atmospheric fading refers to the phenomenon of the fading of dyed textile products due to fume fading and ozone or "O-fading." Fume fading, or gas fading, "is the fading of dyed fabric by acidic gases in the atmosphere, which are formed in combustion processes."<sup>4</sup> "'O-fading' . . . is the shade change that arises as the result of the degradation of the dye molecule by chemical agents in the atmosphere other than the oxides of nitrogen."<sup>5</sup> It has been shown that oxides of nitrogen are the active constituents of combustion gases and that nitrogen dioxide is the active agent which causes the degradation of dyes

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<sup>4</sup>V. S. Salvin, W. D. Paist and W. J. Myles, "Advances in Theoretical and Practical Studies of Gas Fading," American Dyestuff Reporter, XLI (May 12, 1952), P297.

<sup>5</sup>Victor S. Salvin and Ruth A. Walker, "Service Fading of Disperse Dyestuffs by Chemical Agents Other Than the Oxides of Nitrogen," Textile Research Journal, XXV (July, 1955), 575.

in gas fading.<sup>6</sup> Because of a high concentration of combustion gases and, consequently, nitrogen dioxide, industrial areas might be expected to have a greater occurrence of gas fading than nonindustrial areas. However, this does not necessarily apply to O-fading since "it can occur in areas where the atmosphere is known to contain little or no oxides of nitrogen."<sup>7</sup> In the laboratory, ozone has been shown to cause fading which approximates service fading attributed to O-fading. Fading due to ozone in the atmosphere would explain the occurrence of fading in nonindustrial areas since "the concentration of ozone may be relatively high in a nonindustrial atmosphere."<sup>8</sup>

#### Gas Fading

Gas fading can occur on fabrics that are stored in complete absence of light as well as on fabrics that are in use if fumes penetrate the storage enclosure. It is more likely to occur in winter months when more fumes from fuel

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<sup>6</sup>Victor S. Salvin and Ruth A. Walker, "Correlation Between Colorfastness and Structure of Anthraquinone Blue Disperse Dyes," Textile Research Journal, XXX (May, 1960), 381.

<sup>7</sup>Salvin and Walker, "Service Fading of Disperse Dyestuffs by Chemical Agents Other than the Oxides of Nitrogen," p.582.

<sup>8</sup>V. S. Salvin, "Effects of Atmospheric Contaminants on Lightfastness Testing," American Dyestuff Reporter, XLVII (June 30, 1958), P451.

are present in the atmosphere. Not only are fumes from industrial or home fuels sure destruction to a fabric which is subject to gas fading, but one study has also shown that home gas-fired dryers can have a destructive action on certain dyestuffs.<sup>9</sup>

Effects on dyes and fibers. Gas fading characteristically affects certain dyes, colors and fibers more than others. Various studies have shown certain dyestuffs to be subject to gas fading. These are disperse dyestuffs, certain direct dyes, azo acetate dyes, and blue, green, red and violet dyes of the anthraquinone type. A characteristic color change caused by gas fading is a reddening of some blue dyestuffs and mixtures of these blue dyestuffs. Cellulose acetate is the most frequently mentioned fiber affected by gas fading. Aminoanthraquinone dyes have been shown to fade on Dacron polyester fiber but do not fade on wool, nylon or Orlon.<sup>10</sup> The status of viscose and cotton in relation to gas fading is not clear.

Correlation of gas-fading resistance has been made with dyestuff structure and with intrinsic basicity of the dyestuff. Dyestuffs of low

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<sup>9</sup>Arthur I. Hultberg and others, "A Study of the Destructive Action of Home Gas-Fired Dryers on Certain Dyestuffs," American Dyestuff Reporter, XLV (July 16, 1956), P 471.

<sup>10</sup>Salvin, Paist and Myles, op. cit., p. P297.

intrinsic basicity show least gas-fading change.<sup>11</sup>

The interrelation of the fiber and the dyestuff used on a fiber plays a part in gas fading.

The mechanism of gas fading on cellulose acetate is shown to be due to the relatively great absorption of nitrogen dioxide in this material and the low rate of reaction with it. The gas is therefore free to diffuse through the fibers and to attack vulnerable dyes.<sup>12</sup>

Rather than absorbing nitrogen dioxide, Dacron liberates considerable quantities of nitrogen dioxide that would be effective in fading the dyes if it were absorbed. Nylon does not liberate the nitrogen dioxide but absorbs some of the gas in an aqueous test in which nitrogen dioxide is exposed to the fiber through diffusion through the medium of water.

It is believed that the gas is held in the nylon by salt formation, or more probably by nitrosation of the amide links in the polymer structure, and that this compound is broken up by the acid in the aqueous test.<sup>13</sup>

Salvin and Walker have shown that a definite correlation exists between the structure of anthraquinone blue disperse dyes and the colorfastness they exhibit toward gas fading, ozone fading and light.<sup>14</sup>

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<sup>11</sup>Ibid., p. P301.

<sup>12</sup>Ibid.

<sup>13</sup>Ibid., p. P298.

<sup>14</sup>Salvin and Walker, "Correlation Between Colorfastness and Structure of Anthraquinone Blue Disperse Dyes." pp. 381-388.

Gas fading inhibitors. There are two means of reducing the predisposition toward gas fading in dye and fiber combinations. One is to use a gas-fast dye and the other is to treat the dyed material with a protective inhibitor which will absorb or combine with nitrogen dioxide before it can fade the dye. Inhibitors may act in one of four ways;

1. The inhibitor may form a salt with nitrous or nitric acid (or other acids that catalyze the fading). The greater their intrinsic basicity, the greater will be the buffering action of these compounds.
2. The inhibitor may react to form a nitrosamine or a diazonium salt with the nitrogen dioxide by the same type of reaction which causes the dyes to fade.
3. A tertiary amine may react through cleavage of an alkyl group. This involves the oxidation of the alkyl group, reduction of  $\text{NO}_2$  to  $\text{NO}$ , and formation of the nitrosamine.
4. The inhibitor may act as an antioxidant because of the ease with which  $\text{NO}_2$  or nitrous acid are reduced to nitric oxide.<sup>15</sup>

At present there are two types of inhibitors in use.

The fugitive inhibitors, such as melamine triethanolamine, or sodium formate, are applied in a finishing treatment. They give reasonable protection, depending on the depth of shade and the sensitivity of the dye. . . . This type of inhibitor acts by maintaining an alkaline condition of the fabric, under which reactions of gas fading do not occur.

A second type of inhibitor has been developed in recent years. This is the permanent, substantive type, which can be applied during dyeing, represented by  $\text{N,N}'$  - diphenylethylene diamine. These are weakly basic aromatic amines, which act by forming nitrosamines and ring-nitrosated compounds. . . .<sup>16</sup>

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<sup>15</sup>Salvin, Paist and Myles, op. cit., p. P299.

<sup>16</sup>Ibid.



The effectiveness of fugitive inhibitors is reduced by perspiration and protection is lost upon washing. Substantive inhibitors tend to be rather yellow and are therefore not useful in pastel shades. They can be used in darker shades if the quantity of the inhibitor is adjusted to depth of shade. Both types of inhibitors may reduce the lightfastness of some dyestuffs.<sup>17</sup>

Gas fading may be reduced to some extent by a heat treatment. The gas fading testing procedure used by the American Association of Textile Chemists and Colorists warns:

When an acetate fabric has been pressed with an iron which is hot enough to remove all wrinkles, there is danger of sealing the surface of the fabric which would increase the resistance to gas fading. This technique is not conducive to accurate test results.<sup>18</sup>

#### O-Fading

O-fading can occur simultaneously with gas fading and at times it can be differentiated from gas fading only if the conditions under which the fading occurred can be identified. When O-fading is responsible for the major portion of the color change in an anthraquinone blue dyestuff, it may be identified. O-fading is a change in shade

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<sup>17</sup>Ibid.

<sup>18</sup>William D. Appel (ed.), 1962 Technical Manual of the American Association of Textile Chemists and Colorists, (New York: Howes Publishing Co., Inc., 1962), XXXVIII, B-70.

or a bleaching of the dyestuff that is characteristic of gas fading. When gas fading affects a blue dye more than ozone, the reddening tends to mask the color loss caused by O-fading. This is one of the major reasons why O-fading was not recognized as early as the phenomenon of gas fading.<sup>19</sup>

A second reason for the illusive nature of O-fading is that the gas fading inhibitors used on fabrics dyed with gas sensitive dyes also serve to inhibit O-fading. The chief component of most gas fading inhibitors is a strong antioxidant. Not all antioxidants will inhibit gas fading. However, antioxidants that do not inhibit gas fading will act to inhibit O-fading.<sup>20</sup>

Effects on dyes and fibers. Although O-fading occurs mainly with anthraquinone blues, several of the azo red and yellow disperse dyes have been found to be subject to O-fading. "There is no blue disperse dye for acetate, Arnel or Dacron that is resistant to O-fading as well as to light and gas fading."<sup>21</sup> Even though gas-fast dyestuffs do not

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<sup>19</sup>Salvin and Walker, "Service Fading of Disperse Dyestuffs by Chemical Agents Other Than the Oxides of Nitrogen," pp. 581-582.

<sup>20</sup>Ibid., pp. 577,582.

<sup>21</sup>Ibid., p. 582.

require an inhibitor to protect them from gas fading, such an inhibitor or a strong antioxidant should be used on gas-fast dyestuffs to guarantee colorfastness to O-fading.

Laboratory tests have shown that O-fading takes place on Dacron as well as on acetate and Arnel. With Arnel and Dacron, a marked increase in resistance to O-fading is obtained on heat treatment. The penetration of the dye into the fiber is a factor in O-fading behavior, as evidenced by the increase in resistance to O-fading of Dacron fabrics dyed with carrier and by the effect of heat treatment. Optimum resistance to atmospheric fading of Arnel is obtained by use of inhibitor plus heat treatment.<sup>22</sup>

Additional studies by Salvin have shown that ozone fading occurs with greater frequency in the summer. This is distinctly different from gas fading which occurs more frequently in winter months. Salvin also found that ozone fading was more evident in cotton fabrics that were left at an acid pH.<sup>23</sup>

Relationship of ozone and smog. Studies have indicated that smog is instrumental in causing atmospheric fading. "The primary components [of smog] that have been identified are: hydrocarbons, nitrogen dioxide, sulfur dioxide, aldehydes, organic acids, and aerosols."<sup>24</sup> It has been speculated that ozone may be the cause of fading by smog rather than the nitrogen dioxide which is a com-

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<sup>22</sup>Ibid., p. 571.

<sup>23</sup>Salvin, loc. cit.

<sup>24</sup>Thomas P. Lee and others, "Smog Studies: Its Effect on Dyes and Fibers - Part I," American Dyestuff Reporter, XLV (December 3, 1956), 919.

ponent of smog. Richard P. Echels notes: "Haagen-Smit was ultimately able to prove that nitrogen dioxide serves as a catalyst, converting atmospheric oxygen into its unstable form---ozone---in the presence of sunshine."<sup>25</sup> A theory has been advanced that this reaction of sunlight and oxygen to produce ozone may be responsible for damages to fabric which exceed mere sun fading of the dye.

. . . The importance of sunlight in causing deterioration of exposed fabric samples is well known and has been the subject of much investigations. The proven activity of ozone in causing damage and the ability of light to produce ozone have led some to credit photochemical degradation to ozone. . . .<sup>26</sup>

## II. PERSPIRATION AND ANTI-PERSPIRANTS

### Perspiration

The most extensive treatment of the subject of perspiration in relation to its effect on textiles is contained in a series of four articles written for The Rayon Textile Monthly in 1946 and 1947 by Louis C. Barail, chief Bacteriologist of the United States Testing Company, Inc. Barail deals chiefly with the cause and composition of perspiration in relation to means of preventing the odor

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<sup>25</sup>Richard P. Eckels, "Los Angeles Pioneers In The Fight Against Smog," The Reporter, (December 30, 1954), p. 32

<sup>26</sup>Lee and others, loc. cit.

of perspiration. He also discusses means of preventing the odor caused by reactions between decomposed perspiration and fabrics or fabric finishes.

Effect of perspiration on fabrics and finishes.

Fresh perspiration is practically odorless and is acid with a pH of about 4.5. Bacteria and fungi on the skin immediately begin to decompose secreted perspiration, and as the concentration of hydrogen ions increases, the perspiration becomes alkaline. The action of the bacteria and fungi is also responsible for the odor produced. Perspiration has been chemically duplicated in the laboratory, and laboratory tests have shown that sterile perspiration does not increase the odor of the fabrics or finishes nor does it decompose fabrics or fabric finishes.<sup>27</sup>

Fresh perspiration does do serious damage to certain dyes and finishes. Barail noted that fresh perspiration has a reducing action on metallic dyes and causes certain alkaline finishes to precipitate. Other dyes not fast to fresh perspiration are basic dyes and a few direct dyes. Vat dyes, acid dyes and most of the developed colors are fast to fresh perspiration.<sup>28</sup>

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<sup>27</sup>Louis C. Barail, "Perspiration - What Do Textile Men Know About It?" Rayon Textile Monthly, XXVII (December, 1946), 663-4.

<sup>28</sup>Louis C. Barail, "Perspiration Effects on Fabrics," Rayon Textile Monthly, XXVIII (September, 1947), 496.

As the bacterial decomposition of perspiration increases the pH, the destructive action of perspiration increases. It has a decided adverse effect on tensile strength and causes dyes to bleed and to stain fabrics and skin.<sup>29</sup>

Laboratory duplication of the effects of perspiration. Because of the differences in the chemical nature of the perspiration of various individuals it is difficult to anticipate every condition to which a fabric might be subject in wear. Efforts have been made to develop laboratory tests which would approximate actual wear conditions.

C. R. Teichgraber has summarized the history of testing fastness to perspiration of textiles and outlines the progress made toward international standardization of tests.<sup>30</sup>

In reference to the duplication of wear conditions by laboratory tests Teichgraber notes:

With today's knowledge, even a wearing test probably cannot be considered completely reliable to predict a dye's fastness properties under all conditions, as a study of literature indicates that differences can exist between a man and woman's perspiration, a well or sick person, perspiration excreted under conditions of stress through fear or sports, as well as a person's hygienic habits both as regards his person and his clothes. . . .<sup>31</sup>

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<sup>29</sup>Ibid., p. 497.

<sup>30</sup>C. R. Teichgraber, "Perspiration Fastness Testing of Textiles," Canadian Textile Journal, LXXVII (December 9, 1960), 61-66.

<sup>31</sup>Ibid., p. 62.

One study used four test methods on thirty-two rayon and acetate fabrics to determine perspiration colorfastness in the fabrics. It was found that on acetate dyed with direct dyes acid perspiration caused greater bleeding of color than alkaline perspiration. Vat dyed viscose and viscose and cotton fabrics were the fastest to bleeding. Those least fast to bleeding were fabrics dyed with diazo and developed colors. Fading of the same fabrics in wearing tests did not exceed laboratory results.<sup>32</sup>

#### Deodorants and Anti-perspirants

The effects of perspiration on fabrics can be lessened or prevented by reducing the amount of perspiration the body produces, by treating the fabrics or by buffering the astringent substances in anti-perspirants. Deodorants and anti-perspirants are used on the body to eliminate perspiration and/or the odor of perspiration, and germicides fungicides are used on fabrics to prevent further bacterial decomposition of perspiration.

#### Definition of deodorants and anti-perspirants.

Deodorants do not prevent perspiration but merely eliminate the odor by absorbing it, by masking the odor with an odor of its own, or by chemically reducing or suppressing the odor. Rather than merely masking the odor of perspiration

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<sup>32</sup>Pauline Beery Mack and others, "An Evaluation of Four Laboratory and Two Wear Test Methods for Measuring Perspiration Colorfastness in Rayon Fabrics," Textile Research Journal, XX (December, 1950), 866.

an anti-perspirant actually stops perspiration and prevents its decomposition.<sup>33</sup>

. . . A simple deodorant . . . is considered by the Food and Drug Administration to be a cosmetic and as such is not required to list its essential ingredients on the label. Anti-perspirants, however, are classified as drugs because they affect or modify the body processes and as drugs they are required to carry a statement of the active ingredient--which is usually some compound of aluminum.<sup>34</sup>

Exactly how anti-perspirants modify body processes is not certain. In speaking of the action of the astringent substances in anti-perspirants Joseph Kalish stated;

. . . Their mode of action is not entirely clear, but may be related to their power to swell and coagulate skin proteins and thus reduce the size of the opening through which perspiration is discharged.<sup>35</sup>

Effects on textiles. The aluminum salt in an anti-perspirant may be aluminum chloride, aluminum sulfate, aluminum chlorohydroxide complex, basic aluminum formate, aluminum phenolsulfonate, or aluminum sulfamate.<sup>36</sup> The chemicals used in anti-perspirants ". . . do have a damaging action of their own on fabrics, principally when

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<sup>33</sup>Louis C. Barail, "Perspiration - Part II," Rayon Textile Monthly, XVIII (February, 1947), 93-94.

<sup>34</sup>"Anti-Perspirants and Deodorants," Consumers' Research Bulletin, XXXII (September, 1953), 10.

<sup>35</sup>Joseph Kalish "Deodorants and Antiperspirants". Drug and Cosmetic Industry, LXXXV (August, 1959), 265.

<sup>36</sup>"Deodorants and Antiperspirants," Consumer Reports, XXIV (July, 1959), 380.



not properly buffered or when an improper vehicle us [sic] used."<sup>37</sup>

Kalish explains the advantages of buffering anti-perspirants as follows:

Most active astringent compounds have pH values in solution in the acid range. Where the acidity is substantial, and due to a mineral acid of low volatility, textiles in contact with the treated skin area will eventually be weakened and discolored. Buffered mixtures of intermediate acidity have overcome this disadvantage. Buffering is accomplished by mixing the aluminum sulfate or chloride with a compound that neutralizes the acidity produced by hydrolysis, by using soluble aluminum salts of weak acids, or by preparing self-buffered aluminum compounds, such as the aluminum chlorohydroxy complex. These efforts seem to have been quite successful in reducing or eliminating textile attack while retaining astringency for anti-perspirant action.

In a preliminary study of the action of anti-perspirant creams on cotton, linen, viscose rayon, acetate rayon, silk and wool, Ruth R. Bien of the Good Housekeeping Bureau Laboratory reported these conclusions:

1. Silk, wool and acetate rayon are highly resistant under all practical conditions.
2. Linen, cotton and viscose rayon are extremely vulnerable.
3. Maximum damage is produced by ironing without preliminary laundering. Creams which contain no buffering ingredient will usually cause complete destruction of cotton, linen and viscose rayon when so treated.<sup>39</sup>

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<sup>37</sup>Barail, "Perspiration Effects on Fabrics," p. 497

<sup>38</sup>Kalish, loc. cit.

<sup>39</sup>Ruth R. Bien, "The Action of Antiperspirant Creams on Fabrics," American Dyestuff Reporter, XXXV (June 3, 1946), 269.

Fabrics may be treated to prevent bacterial decomposition of perspiration by using dilutions of strong germicides-fungicides which are, at best, semipermanent.<sup>40</sup> Any compound of this nature should have no action on fabrics, dyes and finishes, should be colorless, and should have high efficiency against a number of organisms.<sup>41</sup>

Fabrics which have been damaged by perspiration shall be treated with a semi-permanent germicide to prevent further bacterial attack and loss in color and tensile strength.<sup>42</sup>

This may be done by laundering, drycleaning, or by home washing of the fabric with a special germicidal soap. Unfortunately, the germicidal value of soaps available to the consumer is not great and may add to the deterioration of the fabric.<sup>43</sup>

### III. DRYCLEANING

#### Definition of Drycleaning

Drycleaning is a process by which textiles are cleansed. In earlier days drycleaning was reserved only for delicate garments which could not withstand laundering

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<sup>40</sup>Barail, op. cit., p. 498

<sup>41</sup>Barail, "Perspiration - Part II," p. 93.

<sup>42</sup>Ibid., p. 97

<sup>43</sup>Barail, "Perspiration Effects on Fabrics," p. 498.

or for those which required special attention during cleaning. Drycleaning has become such a popular method of restoring the original appearance to textile products that all types of fabrics are now being drycleaned. Even those articles which were ordinarily washed, such as summer cottons, are being sent to the drycleaner for processing.

. . . When properly run, drycleaning is the safest most efficient means of maintaining the appearance and firmness of all outerwear apparel and most decorative textile furnishings in the home, regardless of fiber content, finish, or construction.

. . . None of the fibers in the whole textile picture are physically or chemically affected by either of the two organic solvents used in drycleaning. These are Stoddard solvent, a petroleum distillate; and perchlorethylene (tetrachloroethylene), a chlorinated hydrocarbon solvent. . . .<sup>44</sup>

#### Color Changes Associated with Drycleaning Process

The majority of reported color changes associated with the drycleaning process tend to be of two types: (1) those in which the damage has occurred before drycleaning and are made apparent by the drycleaning process and (2) those in which the dyes or the method of applying dyes to fabric are not fast to the drycleaning solvents or spotting agents.

Damage occurring before drycleaning. In this first category are gas and ozone fading which may be masked with soil so that the extent of the color damage is not apparent

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<sup>44</sup>Albert E. Johnson, "Are These the Drycleaner's Problem Fibers?," Textile Forum, X (December, 1953), 17.

until the fabric is cleaned.<sup>45</sup> This type of color change is often found in draperies which have hung over radiators and have accumulated dust and dirt. ". . . many stains, such as those of fruit juices or drinks, may be invisible until pressed. The heat of pressing develops a brown indelible stain."<sup>46</sup>

Dyes not fast to drycleaning process. Because the dyes used on some fabrics are soluble in drycleaning solvents, they cannot be drycleaned, and should they also be soluble in water, the fabric may have to be used without cleaning. "The dry cleaners must use moisture on any garment in order to dissolve any water-soluble stains such as sugar, liquor stains, etc. Perspiration odors can only be removed by water."<sup>47</sup> Thus, to be perfectly safe for drycleaning, a dye should be fast to both drycleaning solvents and water. In speaking of new blends being placed on the market, Paul Marcus has stated that "ignorance or disregard on the part of the manufacturers is resulting in the production of new fabrics which cannot be cleaned

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<sup>45</sup>Lyle, op. cit., pp. 384, 387.

<sup>46</sup>George P. Fulton, "Dry-Cleaning Processes," American Dyestuff Reporter, XL (November 12, 1951), P739.

<sup>47</sup>Paul Marcus, "New Blends Create Problems for Dry Cleaners," Textile Industries, CXVI (June, 1952), 91.

by any existing process."<sup>48</sup>

The dyes most commonly affected by drycleaning solvents are vat dyes and azoic dyes. These two classes of dyes are widely used on cotton fabrics because of their generally excellent fastness to washing and to light. . . .<sup>49</sup>

However, the dyes fade or change shade when they are drycleaned and they are most soluble in perchlorethylene.<sup>50</sup> "Reds and pinks are the shades most frequently affected."<sup>51</sup> A change of shade may occur if a combination of two or more dyes is used, and one of them is solvent-soluble.

Pigment printed fabrics are a problem to the dry-cleaner. These fabrics are colored by use of a binder or adhesive which holds finely ground insoluble pigment particles to the surface of a fabric. Some of the organic solvents used for spot removal before drycleaning may dissolve the adhesive or binder and allow the colored pigment particles to leave the fabric.<sup>52</sup>

Because of the large number of complaints about color loss in pigment prints received by the National Institute of Drycleaning and by manufacturers, an investigation was made of the drycleaning test method being used to determine

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<sup>48</sup>Ibid.

<sup>49</sup>C. H. Bayley and A. S. Tweedie, "Solvent Soluble Dyes Cause of Fading," Canadian Textile Journal, LXXIII (February 10, 1956), 57. Reprinted from Technical Bulletin (Ottawa: Canadian Research Institute of Launderers and Cleaners, June, 1955).

<sup>50</sup>Ibid

<sup>51</sup>Ibid

<sup>52</sup>Albert E. Johnson, "Color Problems in Drycleaning." Rayon and Synthetic Textiles, XXIX (September, 1948), 126.

the colorfastness of fabrics to the drycleaning process. It was found that the test results did not correlate with drycleaning conditions. A new test method was advised by the American Association of Textile Chemists and Colorists Committee on Drycleaning Methods. The relative severity of the two most frequently used drycleaning solvents is noted in the test procedure:

Perchloroethylene is used in this test because a) it is as extensively used in commercial cleaning as Stoddard solvent, and b) it is slightly more severe in action than Stoddard solvent. A material which is not affected by perchloroethylene will not be affected by petroleum solvents, whereas the reverse of this fact is not always applicable.<sup>53</sup>

Lacquer prints have also been a problem to the dry-cleaner. In this type of stencil printing, lacquers are applied to the fabrics and the printed fabric is dried to remove the volatile components of the lacquer. Plasticizing oils are left and these keep the lacquer supple. However, these oils are removed by drycleaning solvents. After one drycleaning the prints may be distorted, but after two drycleanings the lacquer cracks and peels and portions of the color of the printed areas are lost.<sup>54</sup>

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<sup>53</sup>A. E. Johnson, "The Development of a New Test Method for Colorfastness to Drycleaning," American Dyestuff Reporter, XLIX (April 18, 1960), P266.

<sup>54</sup>Albert E. Johnson, "Stencil Prints," Modern Textiles, XXXIV (May, 1953), 41.

Some dyestuffs are sensitive to alkalis used in the drycleaning process. These include certain soaps, ammonia and spotting compounds. The National Institute of Drycleaning has reported this type of change mostly in woolen and acetate fabrics.<sup>55</sup> "In the woolens, the brown changes to tan and green to yellow. In the acetates, blue and black change toward red."<sup>56</sup> Fulton notes that "some prints on pure silk . . . are so sensitive to a slight increase in pH that even drycleaning soaps change their color."<sup>57</sup>

Other dyestuffs are affected by acids ". . . such as acid perspiration and acid spotting solutions necessary in the treatment of ink and tannin stains. . . . This condition generally occurs in wool gabardines, and certain wool fabrics for women's garments, particularly light blue, tans, and brown."<sup>58</sup>

#### IV. CONSUMER COMPLAINTS

Although extensive laboratory developments, research and analysis may go into the making of a textile product, the importance of the response of the product to normal

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<sup>55</sup>Johnson, "Color Problems in Drycleaning," p. 126.

<sup>56</sup>Ibid.

<sup>57</sup>Fulton, op. cit., p. P740.

<sup>58</sup>Johnson, "Color Problems in Drycleaning," p. 126.

consumer use cannot be ignored. "All this research and development have gone into fiber facts, yarn data, and fabric analyses, that may or may not indicate the amount of wear and service life the consumer has the right to expect.

. . ."<sup>59</sup> Whether or not the product meets consumer expectations is the determining factor in its success on the consumer market. This fact is recognized by those who must deal with the dissatisfied consumer of the ultimate product.

Our customer point of view is based on the appearance of a textile product whether it is wearing apparel or household fabric. Wearing qualities are intangibles that have defied our technical appraisal for generations, and they will continue to defy us. It is only when we wear and use these products that we become aware of their serviceability. It is only then that the stress-strain data, the colorfastness values, the permanency of the finish, the resistance of the garment to shrinkage, and the many other plaguing serviceability angles enter in. These are consumer values. They would never bother us if we were simply making fabrics to be made into garments for show and not for use.<sup>60</sup>

Industry has been made cognizant of the importance of consumer satisfaction. In a speech presented at the 1953 Annual Meeting of the Textile Research Institute, J. Gordon Dakins of the National Retail Dry Goods Association admonished manufacturers to concentrate on improving the quality of all merchandise offered for sale to the public.<sup>61</sup>

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<sup>59</sup>Jules Labarthe, "Ten Thousand and One Customer Complaints," Textile Research Journal, XXIV (April, 1954), 331.

<sup>60</sup>Ibid.

<sup>61</sup>J. Gordon Dakins, "Textiles' Fight for the Consumer Dollar," American Dyestuff Reporter, XLIV (January 31, 1955), P71.



He further stated:

Widely diversified from the raw product to the retailer's counter, the textile industry is particularly vulnerable to customer claims of poor performance. . . .

To overcome them every segment of your industry and every retailer must bear in mind that the consumer is the boss. . . .

If every producer, converter, dyer, manufacturer and retailer would keep customer satisfaction as the paramount issue in his business life, our major problem would be solved. . . .<sup>62</sup>

Samuel L. Myers forwarded the idea in an article on consumer complaints that the wise producer could use consumer complaint information from the data compiled by testing laboratories as an indication of how a product might be improved.<sup>63</sup> He observed that "it appears to matter little whether the complaints are traceable to inherent merchandise defects or not. If the consumer is experiencing difficulty, trouble is ahead for producers."<sup>64</sup> However, another writer has stated that "consumer complaints occur too long after production to have any significance respecting the particular line of products involved."<sup>65</sup>

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<sup>62</sup>Ibid.

<sup>63</sup>Samuel L. Myers, "Consumer Complaints: A Source of Information for Producers," American Dyestuff Reporter, L (March 6, 1961), P167.

<sup>64</sup>Ibid., p. P169.

<sup>65</sup>Johnson, "Can Claims Adjusting be Standardized?," p. P517.

When any consumer product or consumer service fails to live up to the consumer's reasonable expectations, he has the right to make a justifiable complaint. Consumer Bulletin informs its readers of their responsibility to complain to responsible executives when an unsatisfactory purchase has been made.<sup>66</sup> The reader is advised:

. . . Perhaps you won't always get a refund for your complaint about an unsatisfactory purchase, but you may at least have the satisfaction of being a public benefactor in preventing others from suffering from the same experience.<sup>67</sup>

The use of consumer complaints as an indication of consumer satisfaction and as an index of performance of manufactured goods is not a new technique. However, it still remains an imperfect technique with its limitation inherent in its definition. Not all dissatisfied consumers will complain about poor service or poor performance in a manufactured product. Therefore, the number of dissatisfied customers represented by one complaint is an unknown figure. ". . . Each justified complaint must be multiplied by some large factor, the denomination of which we do not know."<sup>68</sup> Jules Labarthe, Senior Fellow at Mellon Institute, reported that when store buyers are asked how many dissatisfied customers a single justified complaint

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<sup>66</sup>"Don't Just Complain, Do Something!," Consumer Bulletin, XLIII (January, 1959), 34.

<sup>67</sup>Ibid.

<sup>68</sup>Labarthe, loc. cit.

represents ". . . the usual answer is, "Why I sold 100 to 150, maybe 300, and this is the only complaint I have received." <sup>69</sup>

The percentage and types of complaints may change from one season or year to another. This fact has been illustrated in the data compiled of 10,001 customer complaints made to a department store over a fifteen year period, analyzed at Mellon Institute and reported by Jules Labarthe. <sup>70</sup> It is also brought out in data compiled by the National Institute of Drycleaning. Out of 1,091 items analyzed in the first four months of 1950, 243 items or 22 per cent of the damages to the items were due to fume fading. <sup>71</sup> During the year 1961 the laboratory of the National Institute of Drycleaning analyzed 15,055 items to determine the cause of damages to the items. Of the complaints that were considered due to consumer service conditions, atmospheric discoloration in drapery fabrics accounted for 235 complaints, or only 1.6 per cent, of the items analyzed in that year. Of those complaints considered to be due to fabric malperformance, 360, or 2.4 per cent, were due to fume fading on acetate. <sup>72</sup>

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<sup>69</sup>Ibid., p. 329.

<sup>70</sup>Ibid., p. 338

<sup>71</sup>Dorothy Siegert Lyle, "The Challenge of Textile Problems," Journal of Home Economics, XLIII (February, 1951), 85.

<sup>72</sup>Johnson, "Can Claims Adjusting be Standardized?," p. P519.

Another source of inconsistency in consumer complaint data is the variation in means of adjustment and in adjustment philosophy used by department stores and drycleaning establishments. The number of firms that submit complaints to laboratories for analyses is relatively small. There are times when prompt adjustment or lack of adjustment depends on the emotional pitch of the customer or the desirability of trying to save a profitable account. One department store may discontinue an entire line of merchandise if upon investigation of a complaint the performance of the merchandise is found to be unreasonably low. Other stores might adjust the complaint and attach additional care warning tags to similar merchandise left on sale. Some stores find fume fading of fabrics a justifiable complaint while others deem it a characteristic of certain fibers and not subject to adjustment. Some will make an adjustment if a bathing suit fades while others consider the fading due to sun fading and not due to color failure of the bathing suit fabric.<sup>73</sup>

Most of the literature on consumer complaints uses the laboratory analysis reports of the National Institute of Drycleaning for statistical verification of generalizations. At least two studies have been made of the complaints received by retail groups in the United States. One of these is the study referred to above written by

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<sup>73</sup>Myers, op. cit., pp. 167-169

Jules Labarthe. This study continues to be used as a model and reference for succeeding articles on consumer complaints. The study is limited to a discussion of the customer complaints about items which had been returned to one department store and which had been referred to an independent laboratory for impartial analysis. However, only ten per cent of the complaints handled by the department store were subjected to laboratory analysis.

The information in the reference by Myers was secured by analysis of records of the laboratories of six department stores, one mail order firm and one trade association.<sup>74</sup> However, for a more accurate analysis of complaints Myers used data from the National Institute of Dry-cleaning because he deemed it the only ". . . data available in sufficient volume and detail to make possible extended analysis."<sup>75</sup>

In 1954, Marks and Spencers Ltd. of London, England reported the results of an extensive study in which the examination of customers' returns had served as a basis for establishing minimum colorfastness and finishing standards for textile products placed on the consumer market.<sup>76</sup>

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<sup>74</sup>Myers, op. cit., p. 167

<sup>75</sup>Ibid., p. 169

<sup>76</sup>J. S. Ingham, "Colour Fastness and Textile Finishing Requirements of the Ultimate Consumer," Journal of the Society of Dyers and Colourists, LXX (June, 1954), pp. 227-229.

Although the information and data concerning color changes in textile products is included in data of all types of consumer complaints in the existing related literature, it is conspicuous enough to cause concern. In describing the 1961 National Institute of Drycleaning laboratory analyses, Myers stated:

Among problems relating to fabric-caused failures, color failure ranks first. Indeed, no other fabric defect closely approached poor colorfastness in seriousness as a textile problem. Color failures constitute 3,482, or 47.0% of the 7,410 textile failures for which producers are to blame. . . .<sup>77</sup>

Data relevant to color changes in textile products are reported most extensively in tables of customer complaint analyses made at Mellon Institute.<sup>78</sup> The data which apply to color changes in general and those which apply specifically to color changes due to perspiration, anti-perspirants and gas or atmospheric fading have been compiled in Tables I and II.

From these data the effects of perspiration or anti-perspirants and gas or atmospheric fading on garments and fibers may be observed. The most conspicuous data are the preponderance of color changes which occur in women's blouses and dresses and the large number of instances of gas or atmospheric fading on women's dresses. The relatively small number of complaints in men's clothing may be explained by the small number of complaints received in

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<sup>77</sup>Myers, op. cit., p. 170

<sup>78</sup>Labarthe, op. cit., pp. 333-336.

TABLE I  
GARMENTS INVOLVED IN CUSTOMER COMPLAINTS

Causes of Color change	Women's blouses	Women's dresses	Men's suits	Men's shirts	Men's trousers & slacks	Children's dresses	Total
	(1438)*	(2632)*	(177)*	(312)*	(254)*	(166)*	
Perspiration or anti-perspirants	22	140	7	6	2	0	177
Gas or atmospheric fading	31	201	3	0	0	3	238
Other causes of Color change	133	428	11	28	14	38	652
<b>Total</b>	186	769	21	34	16	41	1067

\*Number of complaints from reports of analyses made at Mellon Institute 1935-1953

TABLE II

PRINCIPAL FIBERS INVOLVED IN CUSTOMER COMPLAINTS FROM REPORTS  
OF ANALYSES MADE AT MELLON INSTITUTE 1935-1953

Causes of Color change	Cotton	Wool	Linen	Rayon	Acetate	Silk	Miscell- aneous	Total
Perspiration or anti-perspirants	9	15	5	57	63	10	18	177
Gas or atmospheric fading	0	3	0	7	220	0	8	238
Other causes of Color change	201	20	14	167	104	63	83	652
<b>Total</b>	<b>210</b>	<b>38</b>	<b>19</b>	<b>231</b>	<b>387</b>	<b>73</b>	<b>109</b>	<b>1067</b>



which the principal fiber involved was wool, the fiber most used in men's clothing.

Gas or atmospheric fading appears largely in acetate fabrics and rayon and acetate account for a large per cent of all complaints due to color changes. These fibers are known to appear frequently in women's clothing. Though no complaints were due to atmospheric fading on cotton, linen or silk, no fiber was exempt from damage from perspiration or anti-perspirants. Although 19.7 per cent of the complaints were on cotton fabrics, 18.8 per cent were due to causes of color change other than perspiration or atmospheric fading and were attributed to factors such as sun fading, washing or crocking.

## CHAPTER III

### METHOD OF PROCEDURE

#### I. PREPARATION OF THE QUESTIONNAIRE

A trial questionnaire was designed to secure from retail groups and from drycleaning establishments information related to color changes in textile products. The data to be secured by the questionnaire included:

1. The estimated number of complaints received within a year for all causes of damage to textile products and the number of these which were due to color changes caused by each of these factors: perspiration, anti-perspirants, and fume fading.
2. The number of complaints for which monetary adjustments was made within a year and the cost of these adjustments.
3. Types of household and apparel textiles most affected by color changes and the areas of color change on garments.
4. Fibers and colors most affected by each of these factors: perspiration, anti-perspirants and fume fading.
5. The season of the year in which fume fading damage is most prevalent.
6. Whether color changes were found to be the responsibility of the manufacturer, retailer, drycleaner or consumer.
7. Whether or not a need of further consumer education concerning the problem of color changes existed and why.
8. A description of the population and industrial status of the city of location and the dollar volume of the business surveyed as a means of comparative analysis of data.

### Testing the Effectiveness of the Questionnaire

In order to test the effectiveness of the questionnaire in eliciting desired information, interviews were held with three drycleaners in Greensboro, North Carolina. During each interview the drycleaner was given an uncompleted copy of the questionnaire and was asked to consider for each question (1) whether or not he had access to the information required to answer the question and (2) whether or not he would be willing to give the information if it were available to him. The nature of the study was explained and the responses given to the questions were recorded.

Answers to all questions were obtained from one of the drycleaners interviewed. In this instance the drycleaner owned and operated the drycleaning establishment. Although this drycleaner could recall or estimate most of the information required to answer the questions, he did not maintain accurate records of information of this nature.

The two other drycleaners were reluctant to answer questions which required exact numerical answers since records were not kept of certain information which the questionnaire was designed to obtain. These drycleaners, however, were willing to supply percentages or to check an answer within a numerical range when an exact number could not be given.

### Revision of the Questionnaire

In light of the responses and suggestions made by the three drycleaners interviewed, the questionnaire was modified to include only that information to which drycleaners would be likely to have access. Since data were not available to assign each complaint relating to color change to a definite cause, the factors of perspiration, anti-perspirants and fume fading were treated collectively as acid conditions. Thus it was possible to obtain estimates of their damage to specific fibers and colors.

All of the drycleaners noted that fume fading may occur one or more seasons before it is noted by drycleaners because of seasonal cleaning practices of consumers. The question referring to the seasonal occurrence of fume fading was omitted because of its ambiguous nature.

The question concerning the need of consumer education was revised to eliminate what tended to be repetitive and obvious reasons. A question requesting suggested media for consumer education was substituted.

Other minor changes made in the questionnaire were: (1) the year for which data were obtained was defined as from January 1, 1962 to December 31, 1962; (2) the city population criterion was taken from legends of state population distribution maps illustrated in the 1962 edition

of the County and City Data Book;<sup>79</sup> and (3) provision was made for ascertaining whether the responses to the questionnaire were estimated or taken from business records.

It was assumed that the larger department stores and mail order firms surveyed would have access to information similar to the information available to drycleaners. The same questionnaire was used to obtain information from this group.

The questionnaire in its final form is included as Appendix A.

## II. SELECTION OF DRYCLEANERS

Drycleaners were chosen from a listing of the membership of the National Institute of Drycleaning. This list was subdivided by states and cities and lent itself to sampling by states. In order to establish a means of comparison, an equal number of drycleaning establishments were chosen from each of the forty-eight states of continental United States. A workable number of five drycleaning establishments from each of the states or a total of two hundred forty drycleaning establishments were chosen from the members of the National Institute of Drycleaning by use of a table of random numbers. Since the National Institute of

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<sup>79</sup>U. S. Bureau of the Census, County and City Data Book, 1962 (Washington: U. S. Government Printing Office, 1962, p. 619.

Drycleaning membership roster was not corrected for the current year of 1963, two drycleaning establishments from each state were chosen as replacements for questionnaires that might be returned for reasons related to postal delivery.

Alaska and Hawaii were not included in the survey because of their limited membership in the National Institute of Drycleaning and because of the differences that exist in dress, atmosphere and climate in each of these states. Results which would have been obtained from Hawaii and Alaska were not assumed to be comparable with those of the continental United States.

### III. SELECTION OF RETAIL GROUPS SURVEYED

The original plan for the selection of retail groups for this study called for the random selection of sixty retail groups. The selection was to have been made from a listing of the leading one hundred retail groups by annual dollar business volume in the continental United States. However, the listing required for such a sample was not accessible. As a source of a listing that might be used in this study, the National Retail Merchants Association recommended the use of Fairchild's Financial Manual of Retail Stores.<sup>80</sup> This source alphabetically lists leading

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<sup>80</sup>Fairchild's Financial Manual of Retail Stores  
(New York: Fairchild Publication, Inc. 1960).

independent department stores, mail order firms, and chain department stores and their subsidiaries. It also indicates dollar sales volume for given years. The 1960 issue of this manual was used in this study.

For the purposes of this study it was assumed that in some instances department stores within a chain might be more able to supply the desired information than the main offices of a large chain department store. Since the Fairchild listing gave only the statistics for selected independent groups and entire chains, a comparative listing was deemed necessary.

One criterion for the size of a company or for the size of a town is the number of persons that are employed.<sup>81</sup> If this criterion is used as an index of the size of a retail store, a listing of stores by number of employees might be expected to yield a list similar to that obtained by listing stores according to annual sales volume. Information about the number of persons employed by individual department stores and by mail order firms was obtained from The College Placement Annual, 1963.<sup>82</sup> The limitation of this listing was the fact that the stores represented were limited to those who had job vacancies during 1963 or could

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<sup>81</sup>U. S. Bureau of the Census, op. cit., p. XXVIII.

<sup>82</sup>Warren E. Kauffman (ed.), The College Placement Annual (Bethlehem: The College Placement Council, Inc., 1962).

afford to advertise through the media of The College Placement Annual.

From the two sources indicated, two listings of retail groups were obtained. One was a listing of retail groups in order of dollar volume of net sales for the years 1959 and 1960. The second listing was in order of the number of persons employed by retail groups in the year 1962. The two lists were compared and the names of large chains were eliminated if the name of one of their subsidiaries appeared on either list. Of those remaining, the top thirty retail groups from each list were selected for survey purposes. The resulting list included five mail order firms fourteen chain department stores, twenty-seven independent department stores, and fourteen department stores that were subsidiaries of larger chains.

#### IV. MAILING OF THE QUESTIONNAIRES

The revised questionnaires were mailed with a cover letter that explained the purpose of the study. A stamped self-addressed envelope was included for a prompt return. The cover letter is included as Appendix B.

As addressees were not reached, they were replaced by selecting the address of another drycleaning establishment randomly chosen from the same state or by selecting the first retail group listed that had not been included in the survey sample. Questionnaires that were returned answered



were identified by a pin hole which had been placed systematically on each questionnaire as a means of coding. Each questionnaire was then marked with the date returned, and identified as to whether it was returned by a drycleaner or retail group. The state was noted when the return was from a drycleaning establishment.

Two weeks after the first questionnaires were mailed a follow-up letter and a copy of the questionnaire were mailed to all nonrespondents.

#### VII. TABULATION AND EVALUATION

Questionnaires were hand tabulated as they were returned and were classified as to industrial status of the city of location and area of the country in which the business establishments were located. The regional classification is that adopted by the U. S. Bureau of the Census.<sup>83</sup>

##### West

Pacific: California, Oregon, Washington  
 Mountain: Arizona, Colorado, Idaho, Montana,  
 Nevada, New Mexico, Utah, Wyoming

##### North Central

West North Central: Iowa, Kansas, Minnesota,  
 Missouri, Nebraska, North Dakota,  
 South Dakota  
 East North Central: Illinois, Indiana, Michigan  
 Ohio, Wisconsin

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<sup>83</sup>U. S. Bureau of the Census, Statistical Abstract of the United States: 1962 (Eighty-third edition.) (Washington: U. S. Government Printing Office, 1962), p. XXII.

## South

West South Central: Arkansas, Louisiana,  
Oklahoma, Texas

East South Central: Alabama, Kentucky,  
Mississippi, Tennessee

South Atlantic: Delaware, Florida, Georgia,  
Maryland, North Carolina, South Carolina  
Virginia, West Virginia

## Northeast

Middle Atlantic: New Jersey, New York,  
Pennsylvania

New England: Connecticut, Maine, Massachusetts,  
New Hampshire, Rhode Island, Vermont

No attempt was made to compare the areas of the United States in which the stores were located since some of the stores might have received textile products damaged by color changes from more than one section of the country.

Drycleaning establishments were stratified for comparison in order to determine whether or not one area of the country experienced more damage from any one factor or differed greatly from the other areas of the country in the extent to which color changes and damage to textiles due to color changes occurred.

Drycleaners and retail groups were compared on such factors as percentage of complaints received due to color changes as compared to the total number of complaints received for a one year period.

## CHAPTER IV

### PRESENTATION OF DATA

#### I. DESCRIPTION OF POPULATION SURVEYED

##### Response to Questionnaires

Questionnaires were mailed to the five drycleaning establishments from each of forty-eight states drawn for the sample. Also, questionnaires were sent to sixty retail groups.

Although the response to the questionnaires was low by usual standards of survey return, the response was higher than anticipated for the group surveyed. One week after the questionnaires were mailed, returns numbered ten to fifteen per day. By the end of two weeks, a total of fifty-seven questionnaires, or 24 per cent, had been returned from drycleaning establishments and fourteen, or 23 per cent, had been returned from retail groups.

At the end of this two week period, follow-up letters and copies of the questionnaire were mailed to all nonrespondents. These letters elicited forty-nine additional responses from drycleaning establishments for a total return of 106 questionnaires, or a 44 per cent return. Returns from retail groups after the follow-up letter numbered

twenty-six for a total return of forty questionnaires, or a 67 per cent return.

Tables XXII through XXV in Appendix C serve to indicate the total number of questionnaires returned from each state and the total number returned from each region.

Response by drycleaners. The number of questionnaires returned, by regions, were as follows:

North Central Region	24
Northeastern Region	19
Southern Region	36
Western Region	27
Total Return	<u>106</u>

Although more questionnaires were returned from the Southern Region than from any of the other regions, the number of questionnaires returned per state from the Southern Region was not the greatest. Approximately 2 questionnaires per state were returned from each region. All questionnaires sent to the states of Georgia and North Dakota were returned. Those states from which no questionnaires were returned were: West Virginia, Minnesota, Wisconsin and Vermont.

Ten questionnaires which were mailed to drycleaning establishments did not reach the addressee because they could not be delivered by the post office. The post office returned three because the addressee was unknown; two because the address was incorrect; and five because the addressee had moved and the letter was not forwardable. Three

questionnaires were delivered to the addressee, but the drycleaning establishment had changed hands and no records were available to supply answers to the questions.

Response by retail groups. Of the forty responses received from retail groups, ten were returned unanswered with explanations for inability to provide the information. Of these ten, two retailers replied by letter that the retail store received very few complaints and that these few complaints were not considered a problem. An administrator of a third store stated that the company policy did not permit participation in surveys or the answering of questionnaires. Another customer service representative of a retail store returned the questionnaire unanswered because the drycleaning services of the store had been discontinued. Managers of two retail stores and one mail order firm expressed an inability to undertake extensive research required to answer the questionnaire.

Three of the unanswered questionnaires were accompanied by lengthy letters explaining company policies. As a means of illustrating the viewpoints of retailers, portions of these letters will be included in the sections of this chapter to which the comments apply.

Sources of information from drycleaners and retailers. Data on the sources of the information given on the questionnaires that were returned by the cooperating drycleaners and retailers are presented in Table III. The information

TABLE III  
SOURCES OF INFORMATION

Groups surveyed and total responses	Facts from business records		Estimated		Combination of estimates and facts from business records		No response to question	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Drycleaners								
North Central (24)	1	4.2	11	45.8	11	45.8	1	4.2
Northeast (19)	1	5.3	10	52.6	8	42.1	0	0.0
South (36)	2	5.6	13	36.1	20	55.6	1	2.8
West (27)	0	0.0	8	29.6	19	70.4	0	0.0
Total (106)	4	3.8	42	39.6	58	54.7	2	1.9
Retail groups (30)	1	3.3	12	40.0	16	53.3	1	3.3

supplied on the questionnaires was not taken entirely from business records. Several drycleaners and retailers expressed a willingness to supply such data, but figures were not available. Fifty-five per cent of the drycleaners and 53.3 per cent of the retailers listed information that was a combination of estimates and facts from business records. Forty per cent of the retailers and 39.6 per cent of the drycleaners supplied estimates. However, only 3.8 per cent of the drycleaners and 3.3 per cent of the retailers could supply data taken exclusively from business records.

#### Location of Cooperating Groups

Population of communities represented. The data pertaining to the location of drycleaning establishments by regions is summarized in Table IV and compared with similar data obtained from retail groups. Drycleaning establishments surveyed were located predominately in cities having a population of less than twenty-five thousand. The smallest number of drycleaning establishments was from cities having a population of 100,000 to 249,999 persons. The North Central and Western regions had the largest percentage of drycleaners from the smaller cities. However, the Western Region was also the region with the greatest number of drycleaning establishments located in the larger cities.

Of the retail groups surveyed, 93.3 per cent were located in cities of 250,000 or more population. No retail group was located in a city of less than 50,000 persons.

TABLE IV

POPULATION OF CITIES IN WHICH SURVEYED DRYCLEANING  
ESTABLISHMENTS AND RETAIL STORES WERE LOCATED

Groups surveyed and total responses	Less than 25,000		25,000 to 49,999		50,000 to 99,999		100,000 to 249,999		250,000 or more	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Drycleaners										
North Central (24)	13	54.2	1	4.2	4	16.7	2	8.3	4	16.7
Northeast (19)	7	36.8	3	15.8	3	15.8	4	21.1	2	10.5
South (36)	13	36.1	9	25.0	5	13.9	2	5.6	7	19.4
West (27)	13	48.2	1	3.7	5	18.5	1	3.7	7	25.9
Total (106)	46	43.4	14	13.2	17	16.0	9	8.5	20	18.9
Retail Groups	0	0.0	0	0.0	1	3.3	1	3.3	28	93.3



The size of the location of each of the drycleaning establishments is presented by states in Tables XXII through XXV of Appendix C.

Table XXVI of Appendix D shows that drycleaners from smaller cities described their locations as nonindustrial or as having only a few small industries. Drycleaners from cities of 250,000 or more described their locations as large industrial cities.

Industrial status of communities represented. The data comparing community industrial status for drycleaning establishments and retail groups are presented in Table V. In all regions, with the exception of the Southern Region, the largest percentage of drycleaning establishments were located in cities having only a few small industries. Southern drycleaning establishments were located largely in industrial cities of moderate size. This region also had the largest percentage of businesses from large industrial cities. Surprisingly, 52.6 per cent of the businesses surveyed from the Northeastern Region were in cities which had only a few small industries; however, none were located in nonindustrial cities. As might be expected, the Western Region had a larger per cent of establishments in nonindustrial cities than other regions.

In contrast to drycleaning establishments, of which only 16.9 per cent were located in large industrial cities, 60 per cent of the retail groups surveyed were in large industrial cities. None of the retail groups were located

TABLE V

INDUSTRIAL STATUS OF CITIES IN WHICH SURVEYED DRYCLEANING  
ESTABLISHMENTS AND RETAIL STORES WERE LOCATED

Groups surveyed and total responses	Large Industrial		Moderately Industrial		Few small industries		Nonindustrial		No response	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Drycleaners										
North Central (24)	4	16.7	8	33.3	9	37.5	3	12.5	0	0.0
Northeast (19)	3	15.8	6	31.6	10	52.6	0	0.0	0	0.0
South (36)	8	22.2	14	38.9	9	25.0	5	13.9	0	0.0
West (27)	3	11.1	6	22.2	10	37.0	8	29.6	0	0.0
Total (106)	18	17.0	34	32.1	38	35.9	16	15.1	0	0.0
Retail groups (30)	18	60.0	7	23.3	0	0.0	1	3.34	4	13.3

in cities with only a few small industries, and only one was located in a nonindustrial city.

## II. CONSUMER PROBLEMS AND METHODS OF ADJUSTING CLAIMS

### Methods of Adjusting Claims

The three methods used to settle consumer complaints are summarized in Table VI. These methods included settlement of claims by use of laboratory analysis, without laboratory analysis or by use of National Institute of Drycleaning analysis. Other methods of adjustment were mentioned by a few drycleaners and retailers. Not all groups surveyed used only one method of settling claims. Therefore, the percentages in Table VI total more than one hundred per cent. The data indicate the number and per cent of cooperating groups making use of either method in 1962.

The greatest difference in claim settlement was in the percentage of drycleaners and the percentage of retailers that settled claims without laboratory analysis. Of the drycleaners surveyed, 35.9 per cent stated that at some time they had settled claims without laboratory analysis. Sixty per cent of the retailers subscribed to this practice. Of the drycleaners surveyed, all of which were members of the National Institute of Drycleaning, only 74.5 per cent stated that they made use of an analysis by the National Institute of Drycleaning to settle claims. Retailers

TABLE VI  
METHODS OF CLAIM ADJUSTMENT

Groups surveyed and total responses	Analysis						Other Methods of adjustment		No response to question	
	Without Laboratory		Laboratory		National Institute of Drycleaning		Number	Per Cent	Number	Per Cent
	Number	Per Cent	Number	Per Cent	Number	Per Cent				
Drycleaners										
North Central (24)	7	29.2	0	0.0	17	70.8	4	16.7	0	0.0
Northeast (19)	6	31.6	2	10.5	17	89.5	6	31.6	0	0.0
South (36)	15	41.7	5	13.9	29	80.6	14	38.9	0	0.0
West (27)	10	37.0	2	7.4	16	59.3	13	48.1	2	7.4
Total (106)	38	35.9	9	8.5	79	74.5	37	34.9	2	1.9
Retail groups (30)	18	60.0	9	30.0	10	33.3	11	36.7	1	3.3

reported that 33.3 per cent made use of analyses by the National Institute of Drycleaning in settling claims.

The least frequent settlement of claims without laboratory analysis was reported in the North Central Region. In the Northeastern Region the most extensive use of National Institute of Drycleaning analyses was reported. Drycleaners of the Western Region used analyses by the National Institute of Drycleaning least and made the greatest use of other methods of settlement.

In Appendix D, Table XXVII shows that 88.9 per cent of the drycleaners from large industrial cities used National Institute of Drycleaning analyses to settle claims. However, only 50.0 per cent of the drycleaners from nonindustrial cities used these services and 43.8 per cent of these drycleaners settled claims without laboratory analysis. Other than using National Institute of Drycleaning analysis, drycleaners from moderately industrial cities and those from cities with a few small industries most often settled claims by using methods of their own invention.

Approximately 35 per cent of the drycleaners noted that they used methods of adjustment other than those list-

ed in the questionnaire. These included such methods as:

Canceling cleaning charges  
 American Institute of Laundering analysis.  
 Consulting with the customer regarding  
     cost and service life of garment.  
 Just an honest explanation to the customer.  
 By accepted reasonable estimates.  
 Previous analysis of like nature.  
 Usually we just agree.  
 Respot and reclean.  
 Cash  
 Reimbursement immediately if the fault is ours.  
 Mostly by use of bulletins from the  
     National Institute.  
 Often referred for analysis for our own  
     information after customer is paid.  
 Many by my own past experience and customer's  
     trust in me to do what is right.

Several of the retailers indicated occasional use of other methods of settlement. One store stated that the local drycleaners' institute was used occasionally. Most of the other methods of adjustment listed by retailers could be summarized as being made by company personnel in accordance with company policy or on the merits of the individual case.

The customer service manager of one retail store explained the method of claim settlement in this manner:

Our stores are authorized to refund money, or replace merchandise whenever there is a complaint, without question. . . . So in many cases I am sure the store manager does not feel like the costs are great enough to warrant the time to return the garment to the buyer in New York.

When they do return the merchandise to the buyer, he handles the matter with the manufacturer, sometimes with laboratory tests made, sometimes not.

We make many tests and require many guarantees from our suppliers which are more demanding than those required by smaller buying organizations, to try to prevent problems at the store level. No one can anticipate what will happen in consumer use.

#### Consumer Complaints Related to Textile Products

Not all drycleaners or retailers supplied an answer to the question concerning the number of complaints received in 1962 which were related to wearing apparel and household textiles. In order to determine the average number of complaints of this nature received per establishment, Table VII includes only data from respondents that gave a concrete figure for the number of complaints received. For each region, the total number of complaints reported was divided by the number of establishments responding to the question. In this way, an average number of complaints received per respondent in 1962 could be determined. Data from retail groups were treated in like manner.

It is interesting to note that the Northeastern Region had the highest mean number of complaints per dry-cleaning establishment and the greatest range of complaints received by any region. The Northeastern Region averaged 39.3 more complaints per establishment for 1962 than the highest of the other three regions and 33.8 more than the average number of complaints for all four regions combined.

TABLE VII  
 CONSUMER COMPLAINTS RELATED TO WEARING APPAREL  
 AND HOUSEHOLD TEXTILES

Groups surveyed and total responses	Number of responses to question	Number of complaints received by respondents	Average number of complaints per responding establishment	Range of Complaints
Drycleaners				
North Central (24)	19	1,071	56.4	1 - 500
Northeast (19)	17	1,627	95.7	3 - 550
South (36)	26	1,351	52.0	2 - 300
West (27)	22	1,153	52.4	0 - 400
Total (106)	84	5,202	61.9	0 - 550
Retail groups (30)	15	36,314	2,420.9	12 - 10,000



The range in numbers of complaints for all drycleaners responding in the Northeastern Region was from 3 to 550 complaints. In average number of complaints and in range of complaints, the Northeastern Region was followed by the North Central, Western and the Southern regions.

There was a notable difference in the mean number of consumer complaints per establishment and in the range of complaints between drycleaning establishments and retail groups. Whereas the drycleaning establishments averaged 61.9 consumer complaints related to wearing apparel and household textiles per year, retail groups averaged 2,420.9 complaints per establishment per year. The range of complaints for drycleaners was 0 to 550 while the range for retail groups was 12 to 10,000 per establishment per year.

### III. COLOR CHANGES IN TEXTILE PRODUCTS

#### Consumer Complaints Due to Color Changes

Average number and range. Table VIII presents information regarding consumer complaints due to color changes in textile products. In compiling Table VIII, it was deemed necessary to consider only those respondents that answered the relevant question in order that a mean number of complaints per establishment per year be determined.

Although the drycleaners of the Northeastern Region reported a larger mean number of consumer complaints involving all textile products, the drycleaning establishments

TABLE VIII  
CONSUMER COMPLAINTS DUE TO COLOR CHANGES

Groups surveyed and total responses	Number of responses to question	Number of complaints received by respondents	Average complaints per responding establishment	Range of complaints
Drycleaners				
North Central (24)	23	313	13.6	0 - 55
Northeast (19)	18	305	16.9	0 - 150
South (36)	31	579	18.7	0 - 150
West (27)	24	440	18.3	0 - 250
Total (106)	96	1,637	17.1	0 - 250
Retail groups (30)	17	8,036	472.7	4 - 5,000

of the Southern Region had the largest mean number of complaints due to color changes in textile products. The Southern Region averaged 18.7 color change complaints per drycleaning establishment while the Northeastern Region averaged 16.9 complaints.

The least number of complaints due to color changes and the smallest range of complaints was reported in the North Central Region. For the 23 drycleaners that responded from this region, the range of color change complaints was only 0 to 55. The greatest range of color change complaints was reported in the Western Region. The 24 drycleaners that responded had from 0 to 250 color change complaints per year. The range of 0 to 150 was the same for the Northeastern and the Southern regions.

Again the difference in the averages for retail groups and drycleaning establishments was great. Retail groups averaged 472.7 complaints per year due to color damage, and drycleaners averaged 17.1 complaints. The range of 0 to 250 complaints for drycleaners was small compared to the 4 to 5,000 complaints per year reported by retail groups.

Drycleaners and retailers that did not respond to this query indicated that few complaints were received or that no records were available on which to base a numerical answer.

Per cent of all consumer complaints. To determine the percentage of all consumer complaints which were due to color changes, questionnaires were tabulated which gave both

the number of all consumer complaints and the number of complaints of color change. Seventy-eight drycleaners and sixteen retailers provided both necessary figures. The total number of textile complaints was divided into the total number of color change complaints to determine the percentage of all textile complaints due to color damage. These results are presented in Table IX.

The 78 drycleaners that gave both figures had a total of 4,845 consumer complaints related to textile products of which 1,265, or 26.1 per cent, were complaints of color change. The 16 retailers that gave both responses had a total of 36,434 consumer complaints related to textile products and 8,024, or 22.0 per cent, of these were due to color changes in the textile products. Thus, the per cent of all consumer complaints related to textile products which was due to color damage was 4.1 per cent greater for the drycleaning establishments surveyed than for the retail groups.

Table XXVIII of Appendix D indicates that drycleaners in the large industrial cities had the smallest percentage of all textile complaints due to color change. The drycleaners from cities with fewer industries had a smaller mean number of color change complaints per establishments but had progressively larger percentages of all textile complaints they received to be complaints of color damage.

TABLE IX

## CONSUMER COMPLAINTS DUE TO COLOR CHANGE IN TEXTILE PRODUCTS

Drycleaners giving both total textile and color change complaints	Textile complaints		Color change complaints		Percentage of all textile complaints due to color change
	Number	Average per establishment	Number	Average per establishment	
Drycleaners (78)	4,845	62.1	1,265	16.2	26.1
Retail groups (16)	36,434.0	2,277.1	8,024.0	501.5	22.0

Monetary Adjustment of Complaints Due to Color Change

Number Adjusted. The data relative to the percentage of consumer complaints due to color change which required monetary adjustment are presented in Table X. Ninety-three drycleaners gave both the number of these complaints which required monetary adjustment. Not all consumer complaints required a monetary adjustment. An average of 17.8 complaints per establishment were due to damage by color change. Of these, an average of 5.0 per establishment, or 28.0 per cent, required monetary adjustment.

Of the 16 retailers which supplied both figures, an average of 471 complaints per establishment were due to color damage. The percentage of these complaints which required monetary adjustment was larger than the percentage of color change complaints received by drycleaning establishments. Retailers reported an average of 234.2, or 49.7 per cent, of color change complaints which required monetary adjustment.

In the settlement of color change complaints, retailers settled 21.7 per cent more complaints by monetary adjustment than were settled by the drycleaners.

Table XXIX of Appendix D shows that of the complaints of color change made to drycleaning establishments, the greatest percentage which required adjustment were among complaints made in nonindustrial cities. However, in the

TABLE X

CONSUMER COMPLAINTS DUE TO COLOR CHANGE  
WHICH REQUIRED MONETARY ADJUSTMENT

Groups surveyed and total number supplying figures for number of color change complaints and number requiring adjustment	Number of consumer Complaints in which damage was due to color change		Number of change complaints requiring adjustment		Per cent of color change complaints requiring adjustment
	Total	Average per establishment	Total	Average per establishment	Per cent
Drycleaners (93)	1,652	17.8	462	5.0	28.0
Retail groups (16)	7,536	471.0	3,747	234.2	49.7

the large industrial cities, the mean number of complaints received per establishment was greater than in cities having fewer industries.

Per cent of dollar volume. Ninety-one drycleaners reported the annual business dollar volume and the amount of monetary adjustment made for color change complaints in one year. This data is presented in Table XI. A mean of \$60.18 per establishment was paid for the settlement of color change complaints. The mean business dollar volume amounted to \$113,545.49. Drycleaners paid out .053 per cent of their annual business volume in settlement of color change complaints.

Eleven retail groups paid a mean of \$2,354.09 per establishment to settle consumer complaints of color change. The mean business volume of these groups amounted to \$152,025,909.09. Retailers averaged paying .001 per cent of their business volume per year for color change complaint settlement.

A retail store manager offered this comment on the monetary adjustment of color change complaints:

Despite the fact that we run a very high adjustment rate, the factors mentioned in your questionnaire do not constitute a major, or, to be sure, a minor problem.

Table XXX of Appendix D indicates that drycleaners in cities of moderate industrial status spent the largest



TABLE XI

ANNUAL BUSINESS VOLUME NEEDED TO MAKE MONETARY ADJUSTMENTS  
FOR DAMAGES DUE TO COLOR CHANGES

Groups surveyed and total number supplying figures for annual business volume and adjustments made in 1962	Annual Business Volume		Amount of adjustment paid to consumers		Per cent of business volume paid for adjustments
	Total	Average per establishment	Total	Average per establishment	Per cent
	Drycleaners (84)	\$ 10,332,639.89	\$ 113,545.49	\$ 5,476.20	\$ 60.18
Retail groups (11)	\$1,672,285,000.00	\$152,025.909.09	\$25,895.00	\$2,354.09	0.001

percentage of their annual business volume and the greatest mean amount per establishment on monetary adjustments of complaints of color change. They were followed by drycleaners from cities having few small industries and by those drycleaners from nonindustrial cities. Drycleaners from large industrial cities paid out the smallest percentage of business volume for color damage adjustment.

#### Seriousness of Color Changes in Textile Products

Data relevant to the degree of seriousness attributed to the problem of color change in textile products are presented in Table XII. Since drycleaners qualified their opinions with additional remarks, percentages in this table do not total one hundred per cent. The majority of drycleaners in three regions of the United States found the problem of color change in textile products only moderately serious. The Western region was the one region in which the majority of drycleaners did not think the problem serious to any great extent. The small percentage of business volume required to settle claims may explain the degree of seriousness attributed to the problem of color change.

The majority of the retailers surveyed, 66.7 per cent, did not find the problem to be a serious one, while 30 per cent found the problem only moderately serious.

In a comparison of the reaction of the retailers to the reaction of the drycleaners, it is interesting to note

TABLE XII

## DEGREE OF SERIOUSNESS ATTRIBUTED TO THE PROBLEM OF COLOR CHANGE

Groups surveyed and total responses	Very serious		Moderately serious		Not serious		Other		No response	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Drycleaners										
North Central (24)	2	8.3	12	50.0	8	33.3	2	8.3	0	00.0
Northeast (19)	2	10.5	10	52.6	6	31.6	2	10.5	0	0.0
South (36)	4	11.1	16	44.4	14	38.9	3	8.3	2	5.6
West (27)	4	14.8	6	22.2	13	48.1	2	7.4	3	11.1
Total (106)	12	11.3	44	41.5	41	38.7	9	8.5	5	4.7
Retail groups (30)	1	3.3	9	30.0	20	66.7	0	0.0	0	0.0

that the drycleaners had a smaller per cent of color change complaints requiring adjustment, a larger percentage of business volume paid for adjustments, and thought the color change problem moderately serious. The retailers had the larger per cent of color change complaints requiring adjustment, a smaller per cent of business volume paid for adjustments, and did not find the color change problem a serious one.

In Table XXXI of Appendix D it can be seen that the majority of drycleaners from industrial areas thought the problem of color change to be moderately serious. However, of those located in nonindustrial cities, 56.3 per cent thought that color change in textile products was not serious, only one thought the problem moderately serious, and none found it to be a very serious problem.

#### Most Frequent Causes of Color Changes

Data concerning factors most frequently causing complaints regarding color changes in textile products as listed on the survey questionnaire are presented in Table XIII. Those listed were: perspiration, anti-perspirants and deodorants; fume fading; a combination of perspiration and anti-perspirants; and other causes. Since each respondent could check more than one of these responses, the percentages total more than one hundred and indicate the per cent of the group which found each condition a major factor in causing color changes in textile products.

TABLE XIII

FACTORS MOST FREQUENTLY CAUSING COMPLAINTS REGARDING  
COLOR CHANGES IN TEXTILE PRODUCTS

Groups surveyed and total responses	Perspiration		Anti-perspirants and deodorants		Fume Fading		Combination of perspiration and anti-perspirants		Other Causes		No Response	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Drycleaners												
North Central (24)	15	62.5	9	37.5	14	58.3	13	54.2	7	29.2	0	0.0
Northeast (19)	7	36.8	8	42.1	14	73.7	8	42.1	8	42.1	0	0.0
South (36)	23	63.9	12	33.3	26	72.2	15	41.7	18	50.0	1	2.8
West (27)	13	48.1	8	29.6	14	51.9	11	40.7	12	44.4	1	3.7
Total (106)	58	53.8	37	34.9	68	64.2	47	44.3	45	42.5	2	1.9
Retail Groups (30)	17	56.7	6	20.0	22	73.3	16	53.3	13	43.3	1	3.3

With the exception of the North Central Region, the drycleaners from each region indicated fume fading to be the major factor causing color change damage. Seventy-four per cent of the respondents from the Northeastern Region found fume fading to be a problem. Seventy-two per cent of the Southern drycleaners indicated fume fading as a chief cause, 63.9 per cent indicated perspiration, and 50.0 per cent listed other causes. In the Western Region, 51.9 per cent found fume fading the major factor causing color damage. In the North Central Region, the factor of perspiration was indicated by 62.5 per cent, fume fading by 58.3 per cent, and a combination of perspiration and anti-perspirants by 54.2 per cent of the respondents.

Sixty-four per cent of the drycleaners and 73.3 per cent of the retailers indicated that fume fading was a major factor in causing color damage. These were the largest percentages reported by either group. The major difference in the responses of drycleaners and retailers was in the rank of importance attributed to anti-perspirants and deodorants in causing color damage. Twenty per cent of the retailers considered these major factors, while 34.9 per cent of the drycleaners found them a major cause of color damage. Retailers, as well as drycleaners, found sun fading and inferior dyes to be additional causes of color damage.

Although a large percentage of drycleaners and retailers indicated fume fading to be a frequent cause of complaints about color changes in textile products, one

retail store manager offered these contradictory comments:

Several years ago, gas fading in ready-to-wear and household textiles was a big source of headaches but I truly can't remember the last adjustment of this description I handled.

When analyzed by industrial status of location, Table XXXII of Appendix D shows that the majority of drycleaners from moderately industrial cities and those from cities having a few small industries thought fume fading to be the factor most frequently causing consumer complaints. Drycleaners from large industrial cities equally attributed complaints to fume fading and to a combination of perspiration and anti-perspirants. The greatest deviation was in nonindustrial cities where 68.8 per cent thought perspiration to be the leading cause and only 31.3 per cent found fume fading to be a major factor causing complaints of color change.

#### Colors Most Affected by Acid Conditions

Table XIV presents data relevant to the percentages of drycleaners and retailers that indicated the various colors to be affected by acid conditions such as anti-perspirants, perspiration and fume fading. Because drycleaners and retailers checked more than one color as being affected by color changes, percentages in the table total more than one hundred. The colors which drycleaners observed to be most affected by acid conditions were, in order of those most frequently indicated: blue, green, red,

TABLE XIV

## COLORS REPORTED TO BE MOST AFFECTED BY ACID CONDITIONS

Colors	Drycleaners										Retail Groups	
	North Central (24)		North Eastern (19)		Southern (36)		Western (27)		Total (106)		(30)	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Black	3	12.5	2	10.5	15	41.7	12	44.4	32	30.2	7	23.3
Blue	18	75.0	16	84.2	28	77.8	23	85.2	85	80.2	22	73.3
Brown	6	25.0	3	15.8	5	13.9	8	29.6	22	20.8	8	26.7
Green	15	62.5	12	63.2	18	50.0	10	37.0	55	51.9	13	43.3
Orange	4	16.7	3	15.8	5	13.9	4	14.8	16	15.1	5	16.7
Red	9	37.5	8	42.1	20	55.6	11	40.7	48	45.3	8	26.7
Violet	6	25.0	8	42.1	13	36.1	11	40.7	38	35.9	9	30.0
White	3	12.5	5	26.3	8	22.2	4	14.8	20	18.9	2	6.7
Yellow	1	4.2	0	0.0	8	22.2	2	7.4	11	10.4	0	0.0
Others	2	8.3	1	5.3	1	2.8	2	7.4	6	5.7	3	10.0
No response	1	4.2	1	5.3	2	5.6	1	3.7	5	4.7	1	3.3



violet, black, brown, white, orange, yellow and others. There was little deviation among the regions in the choice of the first three colors most affected by acid conditions. In all regions, except the Western Region, drycleaners named blue, green, and red as the three most affected colors. The drycleaners of the Western Region included black as the second most affected color.

Retailers also named blue, green, violet, red and brown as the colors most affected by acid conditions. In order, retailers listed: blue, green, violet, red, brown, black, orange, white and yellow.

The percentages of drycleaners and the percentages of retailers noting each color as being susceptible to color damage by acid conditions were not extremely different. Blue was chosen as the most frequently affected color by 80.2 per cent of the drycleaners and by 73.3 per cent of the retailers. Green was indicated by 51.9 per cent of the drycleaners and by 43.3 per cent of the retailers. The main differences existed in the percentages of drycleaners and retailers naming white, red and yellow as problem colors. White was noted as a problem color by 18.9 per cent of the drycleaners but by only 6.7 per cent of the retailers. Red was indicated by 45.3 per cent of the drycleaners and 26.7 per cent of the retailers. Whereas yellow was noted as a color affected by acid conditions by 10.4 per cent of the drycleaners surveyed, none of the retailers found it to be of any consequence.

A public relations manager of a mail order firm stated that statistics were not available but made these observations about the problem of color change:

Our biggest problem in color changes occurs in dresses in the deeper colors--blues and reds in particular--causing the most trouble. We adjust without question any item returned by a customer because it faded from laundry, cleaning or wearing, and the problem again is not serious.

On occasion--particularly in our half size garments--we do receive an aggravated complaint from a customer whose undergarments and/or skin has become discolored from the garment bought from us. We immediately make laboratory tests of any stock we have on hand when such a complaint is received, but I cannot recall a case where our stock did not pass normal tests for colorfastness.

Table XXXIII of Appendix D shows how results differed when tabulated by industrial status of the location of drycleaning establishments. The major differences were these: in the large industrial areas, black was found to be more affected and brown less affected by color changes than the total results from all areas of the country; in cities with few small industries, red was reported more often affected by color change than green; and in nonindustrial areas, violet was listed as the eighth most affected color although throughout the country it was the fourth most affected color.

#### Fibers Most Affected by Color Changes Due to Acid Conditions

Drycleaners and retailers each indicated the fibers they considered to be most affected by color changes due to acid conditions. These data are presented in Table XV.

TABLE XV

FIBERS REPORTED TO BE MOST AFFECTED BY COLOR CHANGES DUE TO ACID CONDITIONS

Fibers	Drycleaners										Retail Groups (30)	
	North Central (24)		North Eastern (19)		Southern (36)		Western (27)		Total (106)			
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Acetate	15	62.5	16	84.2	30	83.3	16	59.3	77	72.6	23	76.7
Cotton	8	33.3	3	15.8	10	27.8	7	25.9	28	26.4	5	16.7
Dacron	3	12.5	2	10.5	10	27.8	5	18.5	20	18.9	1	3.3
Linen	2	8.3	1	5.3	3	8.3	2	7.4	8	7.5	1	3.3
Nylon	1	4.2	1	5.3	2	5.6	5	18.5	9	8.5	7	23.3
Orlon	2	8.3	2	10.5	4	11.1	7	25.9	15	14.2	1	3.3
Rayon	11	45.8	8	42.1	20	55.6	19	70.4	58	54.7	16	53.3
Silk	11	45.8	11	57.9	12	33.3	13	48.1	47	44.3	11	36.7
Wool	6	25.0	5	26.3	11	30.6	9	33.3	31	29.3	8	26.7
Others	0	0.0	1	5.3	2	5.6	2	7.4	5	4.7	1	3.3
No Response	0	0.0	0	0.0	1	2.8	2	7.4	3	2.8	1	3.3

Percentages total more than one hundred per cent since no drycleaner or retailer found only one fiber to be affected by color change.

There was little difference of opinion on the fibers which were most affected by color changes. Of the 106 drycleaners surveyed, the consensus of opinion was that acetate, rayon, silk, wool and cotton were, in that order, the fibers most frequently damaged by color changes. In all regions, except the Western Region, a larger percentage of drycleaners indicated acetate to be the fiber most affected by color changes due to acid conditions. In the Western Region, 70.4 per cent of the drycleaners found rayon to be affected by acid conditions while only 59.3 per cent noted acetate.

There were also no great differences in the choice of the fibers less frequently damaged by acid conditions as reported from the four regions. Dacron, linen, nylon, and Orlon were noted to be the fibers least likely to be affected by color damage due to acid conditions.

It is interesting to note that two manmade fibers, rather than the natural fibers, were the fibers of greatest concern to drycleaners. Silk, wool and cotton were checked by 44.3, 29.3 and 26.4 per cent of the drycleaners respectively. They were third, fourth and fifth in order of frequency of mention. Linen was the only natural fiber which was not considered a problem. Only 7.5 per cent of the

drycleaners indicated it to be a fiber affected by color change caused by acid conditions.

In order of frequency of color damage in the fibers listed, the retailers deviated only slightly from the results reported by the drycleaners. The major difference was in the frequency of this type of color damage on nylon. Whereas drycleaners mentioned nylon as the eighth most frequently affected fiber, the retailers placed it in fifth position. Thus, in order of the most frequently affected fibers, the retailers noted acetate, rayon, silk, wool, nylon and cotton. All other fibers were indicated equally by only 3.3 per cent of the retailers.

The percentages of drycleaners and retailers choosing acetate, rayon, silk and wool as the fibers most frequently affected by color damage due to acid conditions were very similar.

The differences in fibers reported to be most affected by color changes when these data were tabulated according to industrial status of location of drycleaning establishments can be seen in Table XXXIV of Appendix D. The results differed from the total response of drycleaners in these ways: rayon was reported to be more affected than acetate by drycleaners from large industrial cities; linen was most affected by color change in cities having few small industries; and cotton was a greater problem and wool less affected by color damage in nonindustrial cities.

Parts of Garments Most Affected by Color Changes

Drycleaners and retail groups were asked to list the four parts of garments that they had observed to be most affected by color changes. The question was structured to allow a free response. Therefore, the percentages in Table XVI total more than one hundred per cent. Of greatest interest to this study was the fact that 83.0 per cent of the drycleaners and 73.3 per cent of the retail groups listed the underarm area as an area most likely to be affected by perspiration and anti-perspirants. Both groups surveyed were in strong agreement.

Other areas mentioned frequently by the drycleaners were the shoulders, collar and back. Of the retailers surveyed, 46.7 per cent included the shoulder area as a garment part affected by color damage while 20.8 per cent of surveyed drycleaners indicated this area to be an area most affected. The collar area was listed by 18.9 per cent of the drycleaners and by 13.3 per cent of the retailers. The back of the garment was noted as an area often affected by color changes by 15.1 per cent of the drycleaners and by 26.7 per cent of the retailers surveyed. All of these areas are subject to the effects of perspiration.

Areas mentioned less frequently were the neckline, sleeves, waist, skirt, front, seat and sides.

The percentages presented in Table XVI show no major differences in the responses made by drycleaners from

TABLE XVI

## PARTS OF GARMENTS REPORTED TO BE MOST AFFECTED BY COLOR CHANGES

Parts of Garments	Drycleaners										Retail Groups (30)	
	North Central (24)		North Eastern (19)		Southern (36)		Western (27)		Total (106)			
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Back	4	16.7	3	15.8	5	13.9	4	14.8	16	15.1	8	26.7
Collar	6	25.0	5	26.3	8	22.2	1	3.7	20	18.9	4	13.3
Front	0	0.0	0	0.0	2	5.6	0	0.0	2	1.9	1	3.3
Neckline	6	25.0	1	5.3	6	16.7	1	3.7	14	13.2	2	6.7
Seat	0	0.0	0	0.0	2	5.6	0	0.0	2	1.9	0	0.0
Shoulders	3	12.5	6	31.6	7	19.4	6	22.2	22	20.8	14	46.7
Sides	0	0.0	0	0.0	0	0.0	2	7.4	2	1.9	0	0.0
Skirt	1	4.2	0	0.0	2	5.6	0	0.0	3	2.8	1	3.3
Sleeves	0	0.0	3	15.8	2	5.6	2	7.4	7	6.6	5	16.7
Underarm	22	91.7	13	68.4	30	83.3	23	85.2	88	83.0	22	73.3
Waist	4	16.7	0	0.0	2	5.6	3	11.1	9	8.5	5	16.7
Others	5	20.8	5	26.3	5	13.9	4	14.8	19	17.9	4	13.3
No Response	0	0.0	3	15.8	3	8.3	2	7.4	8	7.5	2	6.7

different regions. The main difference in response was that only one drycleaner in the Western Region noted frequent color damage to the collar. From 22 to 26 per cent of the drycleaners in other regions mentioned that the collar was a problem area. Retailers also did not find the collar to be as great a problem area as the underarm, shoulder and back areas.

Table XXV of Appendix D presents these same data tabulated according to industrial status of the location of drycleaning establishments. The main deviations from the total results occurred in moderately industrial and nonindustrial cities. In cities of moderate industrial status, the neckline was more affected by color changes than the collar. In the nonindustrial cities, drycleaners reported more damage to the waist area and less to the shoulder area. The shoulder area was the only area that seemed to be patterned according to industrial status of location of drycleaning establishments. The shoulder area was mentioned by a larger percentage from large industrial cities and by progressively smaller percentages of drycleaners located in cities with fewer or no industries.

#### Garments Most Frequently Affected by Color Changes

The number and percentage of drycleaners and retailers that listed various garments as those most affected by color changes are presented in Table XVII. Percentages in the table total more than one hundred per cent since more



TABLE XVII

GARMENTS REPORTED TO BE MOST FREQUENTLY AFFECTED BY COLOR CHANGES

Garments	Drycleaners										Retail Groups (30)	
	North Central (24)		North Eastern (19)		Southern (36)		Western (27)		Total (106)			
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Blouses	11	45.8	10	52.6	11	30.6	8	29.6	40	37.7	11	36.7
Coats	2	8.3	0	0.0	3	8.3	2	7.4	7	6.6	6	20.0
Men's	1	4.2	0	0.0	1	2.8	0	0.0	2	1.9	0	0.0
Women's	0	0.0	0	0.0	3	8.3	0	0.0	3	2.8	0	0.0
Dresses	20	83.3	15	78.9	30	83.3	25	92.6	90	84.9	27	90.0
Pants	0	0.0	0	0.0	3	8.3	4	14.8	7	6.6	1	3.3
Shirts	5	20.8	0	0.0	3	8.3	0	0.0	8	7.6	1	3.3
Skirts	1	4.2	3	15.8	2	5.6	0	0.0	6	5.7	0	0.0
Suits	1	4.2	0	0.0	1	2.8	0	0.0	2	1.9	2	6.7
Men's	2	8.3	0	0.0	0	0.0	0	0.0	2	1.9	0	0.0
Women's	2	8.3	0	0.0	1	2.8	1	3.7	4	3.8	0	0.0
Sweaters	1	4.2	2	10.5	2	5.6	5	18.5	10	9.4	3	10.0
Others	3	12.5	0	0.0	2	5.6	3	11.1	8	7.6	12	40.0
No Response	3	12.5	1	5.3	5	13.9	2	7.4	11	10.4	1	3.3

than one garment was listed by each respondent. Detailed study of this table is not required to identify the garment reported to be most susceptible to color damage. Eighty-five per cent of the drycleaners surveyed included dresses on their lists of the garments having the greatest color change problem. Ninety per cent of the retailers surveyed mentioned women's dresses among the garments most frequently damaged by color change. No other garment was listed by drycleaners or retailers on which there was such complete agreement.

The items mentioned as the second most frequently affected garments were blouses. Twenty-nine per cent of the drycleaners listed blouses, and 36.7 per cent of the retailers included blouses on their lists of the color change problems. Although 84.9 per cent of the drycleaners listed dresses, only 37.7 per cent listed blouses, the garment which was second in order of frequency of mention. This difference held true with retailers. Ninety per cent listed dresses, but only 36.7 per cent included blouses in their listings.

Although drycleaners and retailers agreed that dresses and blouses were the most frequently affected garments, they did not agree on the order of frequency of complaints about color change in other garments. The six garments listed by drycleaners, in order of those most frequently affected by color changes were: dresses, blouses, sweaters, shirts, coats and pants. Retailers mentioned, in order:

dresses, blouses, coats, sweaters, and suits. The main differences in the reports of drycleaners and retailers were that the drycleaners had more trouble with skirts and the retailers had more trouble with coats and a variety of other garments.

Both groups listed garments other than those included in Table XVII. These additional garments or garment groups listed by the drycleaners were: outerwear, women's clothing, knits, clothing made of synthetic fabrics, coat and suit linings, rain coat linings, and acetate bathrobes. Retailers listed more diversified problem garments. These included: playwear, bathing suits, men's pajamas, reprocessed wool garments, wool robes, slippers, linings, children's polo shirts, shoes and accessories made in foreign countries.

Table XXXVI of Appendix D shows three articles of clothing which seem to fall into a pattern when analyzed according to industrial status of location for responding drycleaners. Dresses, suits and sweaters were listed by a larger percentage of drycleaners from large industrial cities and by progressively smaller percentages of drycleaners from cities having fewer industries.

#### Household Textile Articles Most Affected by Color Changes

Data concerning household textiles most affected by color changes are presented in Table XVIII. Because more than one article was listed by many of the respondents, percentages do not total one hundred but indicate the

TABLE XVIII

## HOUSEHOLD TEXTILE ARTICLES REPORTED TO BE MOST AFFECTED BY COLOR CHANGES

Household textile articles	Drycleaners										Retail groups (30)	
	North Central (24)		North Eastern (19)		Southern (36)		Western (27)		Total (106)			
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Curtains	3	12.5	1	5.3	9	25.0	1	3.7	14	13.2	3	10.0
Draperies	20	83.3	13	68.4	24	66.7	18	66.7	75	70.8	20	66.7
Rugs	0	0.0	0	0.0	1	2.8	0	0.0	1	0.9	7	23.3
Slip covers	4	16.7	5	26.3	9	25.0	1	3.7	19	17.9	7	23.3
Spreads	2	8.3	1	5.3	8	22.2	1	3.7	12	11.3	2	6.7
Upholstery	0	0.0	0	0.0	0	0.0	1	3.7	1	0.9	4	13.3
Others	1	4.2	0	0.0	1	2.8	2	7.4	4	3.8	5	16.7
No response	1	4.2	4	21.1	10	27.8	5	18.5	20	18.9	6	20.0

the percentage of each group that found each article to be affected by color changes.

Draperies were the household textiles most frequently mentioned as being affected by color damage. A larger number of drycleaners listed draperies as a problem household textile than did retailers. In the Western Region alone, 18 drycleaners listed draperies as a household textile affected by color change. Only six other diverse textile products were mentioned. A high percentage of respondents agreed that draperies, more than any other household textile, were a major color change problem.

Several respondents listed curtains as presenting problems in color change. Ten per cent of the retailers listed curtains and 66.7 per cent listed draperies. Of the drycleaners that responded, 13.2 per cent mentioned curtains and 70.8 per cent mentioned draperies. If curtains and draperies were considered together as a class of household textiles, the combined percentages would be 84.0 per cent for drycleaners and 76.7 per cent for retailers. These percentages greatly exceed those for any other household textile listed.

Of the drycleaners surveyed, 17.9 per cent listed slip covers as being susceptible to color change, and 23.3 per cent of the retailers listed this same textile product. Whereas the retailer noted rugs to be a problem equal to that of slip covers, only one drycleaner made any mention of rugs as presenting color change problems. One would

assume this to be due to the fact that the retail store may sell rugs but the drycleaner is seldom called upon to clean them. This reasoning may also explain why 4 retailers found upholstery susceptible to color damage but only 1 drycleaner found it a problem.

Other household textiles mentioned by drycleaners and retailers as being easily affected by color change included: table cloths, painted or glued designs, wool blankets, blanket bindings, shower curtains, printed towels, and decorator pillows.

A mail order firm manager who could not supply figures contributed these comments about color change of household textiles:

We have very few complaints about fading as far as drapery materials are concerned. Fading of rugs is now practically extinct.

We have occasional problems with "crocking" in our slip cover department. Generally, the crocking is sufficiently slight so that the furniture is not damaged and a simple replacement of the slip cover suffices. Perhaps once every two or three years we receive several complaints on one particular slip cover to warrant our checking our stock on a particular cover and perhaps returning a lot to the manufacturer. Serious crocking where it is necessary to replace or reupholster a piece of furniture is very rare, but does happen every three or four years.

Returns were tabulated according to the industrial status of the location of drycleaning establishments and these data are presented in Table XXXVII of Appendix D. In large industrial cities no drycleaner reported curtains

as being frequently damaged by color changes; however, 61.1 per cent mentioned draperies.

#### Causes of Color Changes in Textile Products

Drycleaners and retail groups were asked to judge the ultimate causes of color changes in textile products. The alternatives given were: (1) use of inferior types of dyes by textile manufacturer, (2) damages which occur in display and/or storage by the retailer, (3) improper drycleaning, and (4) consumer use and/or misuse. Twenty-six per cent of the drycleaners and 3.3 per cent of the retailers reported additional causes.

Table XIX presents a most interesting response to this question. Neither group indicated only one cause and chose to divide the source of responsibility of color damages to textiles. Hence, percentages total more than one hundred per cent. Sixty-eight per cent of the drycleaners and 56.7 per cent of the retailers believed improper dyes used by the manufacturer to be a major cause of color change damage. Retailers were more inclined to assign the responsibility to consumer use and/or misuse. Of those surveyed, 73.3 per cent of the retailers placed the responsibility on the consumer while 50.0 per cent of the drycleaners indicated consumer responsibility for color damage.

Perhaps the most interesting outcome was that drycleaners were more likely to assign the responsibility for

TABLE XIX

## REPORTED CAUSES OF COLOR CHANGES IN TEXTILE PRODUCTS

Groups surveyed and total responses	Improper dyes used by manufacturer		Damages in display and storage by retailer		Improper drycleaning		Consumer use and/or misuse		Other Causes		No response to question	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Drycleaners												
North Central (24)	15	62.5	7	29.2	3	12.5	13	54.2	6	25.0	1	4.2
Northeast (19)	12	63.2	8	42.1	0	0.0	13	68.4	3	15.8	2	10.5
South (36)	26	72.2	12	33.3	5	13.9	16	44.4	14	38.9	3	8.3
West (27)	19	70.4	7	25.9	1	3.7	11	40.7	4	14.8	4	14.8
Total (106)	72	67.9	34	32.1	9	8.5	53	50.0	27	25.5	10	9.4
Retail Groups (30)	17	56.7	1	3.3	11	36.7	22	73.3	1	3.3	1	3.3



color change damage to the retailer than to the drycleaner and the retailer reacted exactly oppositely. Thirty-two per cent of the drycleaners attributed the cause of color damage to damages in display and storage by the retailer; however, 8.5 per cent of the drycleaners believed that improper cleaning could be a factor in causing color damage. Of the retailers surveyed, 36.7 per cent noted improper cleaning to be a cause of color damage while only one retailer would admit any fault to lie with the retailers' treatment of textile products.

The only important difference in response to the question by drycleaners among the various regions was made by the Northeastern Region. In this region the largest per cent of drycleaners believed that color damages occurred during display and storage when the textile products were in the hands of the retailer. The Northeastern Region was also the only region in which no drycleaner would attribute the cause of color changes to improper drycleaning methods.

Table XXXVIII of Appendix D shows that although improper dyes were considered the main cause of color change, drycleaners from large industrial cities did not consider it as great a cause as drycleaners from less industrial areas. The largest percentage of drycleaners who felt that damages in display and storage by the retailers were the chief cause of color change were from cities having only

a few small industries. Yet, the smallest percentage of drycleaners who felt this way were located in nonindustrial areas.

### III. CONSUMER EDUCATION

#### Effectiveness of Additional Consumer Education

When asked if additional consumer education would aid in decreasing the number of color change complaints received, 85.9 per cent of the drycleaners and 90.0 per cent of the retail groups felt that consumer education would aid in reducing the number of complaints. These data are presented in Table XX.

In Table XXXIX of Appendix D is illustrated the importance placed on consumer education by drycleaners according to the industrial status of location of drycleaning establishments. Drycleaners from large industrial cities thought consumer education most important while those drycleaners from cities having a few small industries saw the least need for additional consumer education.

#### Consumer Education Methods

Table XXI presents the many suggested methods of educating the consumer about color change problems. Various improvements in labeling were mentioned by the greatest percentage of drycleaners and retailers. These improvements included: care instructions on garments, fiber content labels on textiles, hang tags on garments,

TABLE XX

USEFULNESS OF ADDITIONAL CONSUMER EDUCATION IN EFFECTING  
A DECREASE IN THE NUMBER OF COLOR CHANGE COMPLAINTS

Groups surveyed and total responses	Will decrease complaints		Will not decrease complaints		No Response	
	Number	Per cent	Number	Per cent	Number	Per cent
Drycleaners						
North Central (24)	22	91.7	2	8.3	0	0.0
Northeast (19)	16	84.2	3	15.8	0	0.0
South (36)	31	86.1	4	11.1	1	2.8
West (27)	22	81.5	4	14.8	1	3.7
Total (106)	91	85.9	13	12.3	2	1.9
Retail Groups (30)	27	90.0	2	6.7	1	3.3

TABLE XXI  
EFFECTIVE METHODS OF EDUCATING CONSUMERS  
REGARDING COLOR CHANGE PROBLEMS

Consumer education methods	Total drycleaners (106)		Retail groups (30)	
	Number	Per cent	Number	Per cent
Labeling				
Care instructions on garments	1	0.9	5	16.7
Fiber content on textiles	1	0.9	2	6.7
Hang tags on garments	9	8.5	4	13.3
Woven tags in garments	9	7.5	2	6.7
More information from manufacturer on garment labels	7	6.6	10	33.3
Television	19	17.9	3	10.0
Newspaper advertising and columns	16	15.1	4	13.3
Public relations and personal contacts	16	15.1	3	10.0
Magazine articles				
Women's magazines	9	8.5	3	10.0
Popular magazines	5	4.7	4	13.3

TABLE XXI (continued)

Consumer education methods	Total drycleaners (106)		Retail groups (30)	
	Number	Per cent	Number	Per cent
Public school home economics	11	10.4	0	0.0
Radio	10	9.4	0	0.0
Education of retailers	6	5.7	0	0.0
National institutional advertising	6	5.7	6	20.0
Educational programs	4	3.8	0	0.0
N.I.D. testing for manufac- turers	4	3.8	0	0.0
Technical bulletins to and education of store buyers	3	2.8	1	3.3
Better contact between dry- cleaners and retailers	2	1.9	0	0.0
Stable dyes produced by manufacturer	2	1.9	1	3.3
Cleaners become members of N.I.D.	1	0.9	0	0.0
Direct mail	1	0.9	0	0.0
Education of sales personnel	1	0.9	2	6.7

TABLE XXI (continued)

Consumer education methods	Total drycleaners (106)		Retail groups (30)	
	Number	Per cent	Number	Per cent
Home demonstration agents	1	0.9	0	0.0
Instructions to laundries and cleaners	1	0.9	0	0.0
Telephone	1	0.9	0	0.0
Others	6	5.7	0	0.0

woven tags in garments, and more information from manufacturers on garment labels.

Although both groups found labeling most important, they differed in the choice of secondary approaches. Drycleaners felt that television was the next best method and further chose improved public relations, newspaper advertising and columns, magazine articles, public school home economics, radio, national institutional advertising and the education of retailers. Although six drycleaners thought retailers needed more education, only one drycleaner and two retailers felt that sales personnel needed more education. Here, again, drycleaners were willing to place responsibility on the retailers whereas no retailer surveyed felt that further education of the retailer would aid in reducing consumer complaints.

One drycleaner expressed the opinion that the public would not read printed matter. Perhaps this is the reason television was viewed as an ideal method of consumer education. Several drycleaners gave an explanation of their choice of consumer education. Some of the comments made by these drycleaners were:

Printed matter with every item sold. It reaches the customer the same time the merchandise does.

Most of the trouble is done in the home or at a laundrymat coin cleaning plant. Most good laundries and dry cleaners are

up on the use of material to clean with and inspect articles to clean in the presence of customers.

Make the retailer stop overselling and telling their customers that their products are fade proof.

The trouble we believe in advertising is the lack of telling the truth nationally, locally, and misrepresentation of a product. Any garment looks good new but what does it look like reprocessed by even experts after the party or coffee or tea or auto accident?

By educating retailers and store buyers so they will not buy or stock garments that are not serviceable; only then will the manufacturer stop cutting corners and produce serviceable garments.

It would help in this area to educate the public as to what fabrics are affected by sunfade and how to protect against gas fumes.

Give up on the old folks and start with the young ones in school.

The drycleaners in the Southern Region suggested the widest variety of consumer education methods. It was the only region in which these methods were mentioned: instructions to laundries and cleaners; fiber content labels on textiles; better contact between drycleaners and retailers; cleaners becoming members of the National Institute of Drycleaning; direct mail; telephone; education of sales personnel; home demonstration agents; and more stable dyes produced by manufacturers. Of these, retailers mentioned fiber content labels on textiles; education of



sales personnel; and more stable dyes produced by the manufacturer.

Retailers did not place television and public relations at the head of the list but trusted the consumer to read magazine articles. They suggested national institutional advertising, newspaper columns and advertising, public relations, television and the education of sales personnel. Among their comments were these:

Why not start at the fabric level. Dyes and fabric less likely to fade would solve part of the problem. Cleaning and washing instructions are often false or mis-leading.

Educate at the time of the complaint and at the point of the sale.

White garments which closely resemble cotton (when they contain a manufactured fiber which turns yellow from household bleach) should be labeled.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

#### Summary

It has long been known that changes occur in the colors of textile products. The extent to which these changes occur in consumer use, the colors and fibers most affected, and the major causes of these color changes have been inferred from consumer complaint data. These data have been compiled at laboratories where textile products submitted by retailers and drycleaners were analyzed for determination of the cause of the color change and for a suggested means of settling the complaint.

The inadequacy of laboratory data lies in the fact that not all complaints received by retailers and drycleaners are considered serious enough to be submitted for laboratory analysis. Although data from the individual drycleaners and retailers might be more reliable than data from laboratories, the description of color changes as they occur when textiles are in the hands of the consumer must still be inferred.

This study was designed to secure data from the source where consumer complaints were originally registered.

Of particular interest in this study was information concerning the types and prevalence of complaints of color change which might be caused by perspiration, anti-perspirants, atmospheric contaminants and combinations of these factors. To secure this information, questionnaires were mailed to five drycleaning establishments from each of forty-eight states and to sixty leading retail stores and mail order firms. Drycleaning establishments were selected from the members of the National Institute of Drycleaning by use of a table of random numbers. Retail groups were chosen by selecting those for which there was published information indicating annual business volume or number of persons employed. Two weeks after questionnaires were mailed, a follow-up letter and a second copy of the questionnaire were mailed to those drycleaners and retailers that had not responded. Questionnaires were hand tabulated and those from drycleaning establishments were classified according to four regions of the United States. Drycleaners returned 106 questionnaires for a 44 per cent return, and returns from retailers numbered 40, or a 67 per cent return. Data supplied on these questionnaires was a combination of estimates and figures from business records. Less than 4 per cent of either group could give data taken exclusively from business records.

Drycleaning establishments were located predominately in cities with a population of less than twenty-five

thousand and a few small industries. The majority of retail establishments were located in large industrial cities which had a population of 250,000 or more.

The majority of the drycleaners used analyses by the National Institute of Drycleaning in settlement of some claims; however, 35.9 per cent often settled claims without laboratory analysis. The majority of retailers settled claims without laboratory analysis. Several stated that this was done because goods were submitted to laboratory tests before merchandising and were sold with a guarantee that money would be refunded if goods did not prove satisfactory.

Drycleaning establishments received from 0 to 550 consumer complaints per year or a mean of 61.9 complaints per establishment. Retailers received from 12 to 10,000 complaints per year for an average of 2,420.9 per establishment. Of these complaints, the percentage which were due to color changes in textiles was approximately 26 per cent for drycleaners and 22 per cent for retailers. Drycleaners settled approximately 28 per cent of these complaints of color change by monetary adjustment while retailers settled 49.7 per cent in this manner. However, the total amount paid out by drycleaners and retailers in settlement of complaints of color change was only a fraction of one per cent of their total business volume for one year.

Drycleaners regarded the problem of color damages to be more serious than did retailers. Drycleaners had a

smaller percentage of color complaints which required monetary adjustment but a larger percentage of business volume paid for adjustments. It is possible that this latter figure might have the greatest influence on the dry-cleaner's evaluation of the seriousness of the problem of color change.

The colors which drycleaners reported to be most affected by anti-perspirants, perspiration and atmospheric contaminants were, in order of those most frequently indicated: blue, green, red, violet, black, brown, white, orange and yellow. Retailers did not deviate greatly in listing these colors: blue, green, violet, red, brown, black, orange, white and yellow. It is interesting to note that fume fading was listed by both groups as the major factor causing color damages. Literature on laboratory studies of fume fading indicates that this phenomenon affects blue, green, red and violet dyes of the anthraquinone type. The data compiled in this study show that 18.6 per cent more drycleaners than retailers mentioned red as a color most affected by color damages. Literature reviewed stated that reds and pinks were affected by perchlorethylene, one of the solvents used in drycleaning. Azo red and yellow disperse dyes have been found to be subject to ozone fading. Yellow was considered a problem color by 10.4 per cent of the drycleaners but by none of the retailers. Brown was more of a problem to retailers than to drycleaners. It was one of the colors mentioned

in literature as being affected by acid perspiration.

Fibers which drycleaners reported to be most affected by acid conditions were: acetate, rayon, silk, wool and cotton. Retailers noted these fibers in the same order with one exception. They found nylon to be a greater problem than cotton. Literature regarding laboratory analysis of customer complaints made at the Mellon Institute from 1935 to 1953 indicate that fibers most affected were: acetate, rayon, cotton, silk, wool and linen. It can be seen that the results of the early study are similar to the findings of this study. The one great difference was that cotton was a much greater problem in the earlier study. Although there is no data on which to base such a conclusion, common experience would suggest a reason for this difference. Because of the new blends and fibers introduced in the last ten years, it is possible that fewer garments are being made entirely of cotton than in past years.

Retailers and drycleaners were in strong agreement that the underarm area was the area of the garment where color damages most often occurred, that dresses and blouses were the garments most affected and that draperies were the household textiles most affected by color changes. Reports from the Mellon Institute laboratories from 1935 to 1953 also showed that dresses and blouses were the two garment types about which more complaints of color change were received.

Retailers thought color damages were chiefly due to consumer use and/or misuse while drycleaners felt they were due to the improper use of dyes by the manufacturer. Both groups stated that additional consumer education would aid in reducing the number of complaints they received and suggested a number of consumer education methods. Both thought improved labeling of the utmost importance. Secondary choices of consumer education methods were television advertisements and magazine articles.

Data were classified according to the region of location of drycleaning establishments. The few differences in response among regions are summarized below.

In the North Central Region, there was a greater percentage of drycleaners from cities of less than 25,000 than in any other region. More of these drycleaners thought color change complaints were caused by fume fading and a combination of perspiration and anti-perspirants. The North Central Region was also the region in which the greatest percentage of drycleaners thought additional consumer education would help reduce consumer complaints.

The Northeastern Region had the greatest percentage of establishments located in cities of 100,000 to 249,999 population, a larger percentage of drycleaners who used National Institute of Drycleaning analyses, a greater average number of consumer complaints per establishment, and the largest percentage of drycleaners who believed color complaints to be due to anti-perspirants and deodor-

ants. More thought complaints of color change to be due to display and storage by retailers and consumer use and/or misuse than drycleaners from other regions.

The Southern Region had the greatest percentage of drycleaning establishments from large industrial cities, the greatest percentage of drycleaners who settled complaints without laboratory analysis, the largest mean number of color change complaints per establishment and the greatest percentage who thought perspiration to be the major cause of color changes. This group also had the largest percentage who believed complaints might be due to improper drycleaning and these drycleaners suggested the greatest variety of methods of consumer education.

The Western Region had the largest percentage of drycleaning establishments located in nonindustrial towns, the greatest percentage who thought color change problems were not serious, and the greatest percentage of drycleaners who thought improper dyes produced by manufacturers were the cause of consumer complaints of color change.

These same data, classified according to the industrial status of the location of the drycleaning establishments, indicated some differences which might be influenced by an industrial or nonindustrial environment.

Large industrial cities had the greatest percentage of drycleaners who had a large annual business volume and used laboratory analysis in settling claims. They had the



highest mean number of textile complaints per establishment and the highest mean number of color change complaints per establishment that required monetary adjustment. More of these drycleaners considered the problem of color change serious and felt additional consumer education would aid in reducing consumer complaints.

Moderately industrial cities had the greatest percentage of drycleaners who thought fume fading a major cause of consumer complaints and had color change problems with dresses, the color blue, and acetate fibers. They had the greatest mean number of color change complaints per establishment for settlement of complaints and the greatest percentage of business volume paid for these adjustments. A greater percentage of drycleaners from this industrial environment than from any other industrial classification thought improper drycleaning and consumer use and/or misuse to be major factors in causing color change complaints.

Drycleaners from nonindustrial cities settled more complaints by monetary adjustment and had the largest percentage of textile complaints due to color change. Yet, more of these drycleaners did not consider the problem of color change serious and settled more complaints without laboratory analysis than drycleaners from other industrial areas. Only a small number thought color change complaints due to fume fading but placed the responsibility for the cause of complaints on the manufacturer for his use of improper dyes.

### Conclusions

Laboratory data are indicative of complaints received by drycleaners although not all drycleaners send complaints to laboratories for analysis. Color change data obtained from retailers are comparable with data obtained from drycleaners. The differences that exist are due to the differences in relative size and business volume. Retailers handle a greater variety of color change problems. Some differences in types of color change complaints received by drycleaners can be noted when classified by geographic region or by the industrial status of locations of drycleaning establishments.

Although problems of color change are considered moderately serious, they do not represent a large expenditure for adjustments when viewed in terms of the percentage of annual business volume required to settle complaints. Cooperating groups seemed to indicate a greater concern for good public relationships and good personal relations with each customer.

Although more difficulty with atmospheric contamination was anticipated from cities of large industrial size, data seem to indicate that problems related to atmospheric contamination were more prevalent in industrial cities of moderate size. Perspiration and anti-perspirants are probably responsible for a great deal of color damage since underarm, shoulder and back areas were mentioned so frequently as areas where greatest damages occur in garments.

Drycleaners and retailers feel the need for improvement in dyes and for additional consumer education. Better labeling of textiles by producers is seen as an effective means of educating the consumer as to the product's expected performance.

#### Recommendations for Further Study

If a study similar to this study is attempted in the future, drycleaners should be asked to keep specific, accurate records for a definite period of time. This would eliminate the problem of basing conclusions on estimated data. It may not be feasible to employ random sample techniques when asking such cooperation since the rate of return might be even lower than the rate of return in this study.

To determine a more direct and exact estimate of problems of color change that consumers experience, homemakers could be interviewed and asked to give essentially the same information compiled in this study. It may also be of interest to discover how much is known by the average consumer regarding color damages and their causes.

Another approach to determination of the extent and severity of color changes caused by perspiration, anti-perspirants and atmospheric contaminants would be to sample fabrics on sale in leading stores and test the fastness of colors to these factors.

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APPENDIXES



APPENDIX A

SURVEY QUESTIONNAIRE

SURVEY OF CONSUMER PROBLEMS RELATED TO COLOR CHANGES IN TEXTILE PRODUCTS

1. Population of city where business is located  
\_\_\_\_(1) Less than 25,000                      \_\_\_\_ (4) 100,000 to 249,999  
\_\_\_\_(2) 25,000 to 49,999                      \_\_\_\_ (5) 250,000 or more
2. Description of city's industrial status  
\_\_\_\_(1) Large industrial city                      \_\_\_\_ (3) Has a few small industries  
\_\_\_\_(2) Moderately industrial                      \_\_\_\_ (4) Nonindustrial
3. \_\_\_\_\_ Estimate the number of consumer complaints related to wearing apparel and household textiles received by your establishment from January 1, 1962 to December 31, 1962.
4. How are consumer complaints handled by this establishment?  
\_\_\_\_(1) Settled without laboratory analysis  
\_\_\_\_(2) Settled by use of laboratory analysis  
\_\_\_\_(3) Settled by use of National Institute of Drycleaning analysis  
\_\_\_\_(4) Other methods of adjustment \_\_\_\_\_
5. \_\_\_\_\_ Estimate the number of consumer complaints received from January 1, 1962 to December 31, 1962 in which the damage was due to color changes in textile products.
6. \_\_\_\_\_ Of all consumer complaints received due to color changes in textile products in 1962, what number required a monetary adjustment?
7. \$ \_\_\_\_\_ If possible, give the amount of this adjustment paid to the consumer for the year 1962 for color changes in textile products. (If you cannot give the exact amount, estimate the cost of this adjustment. \$ \_\_\_\_\_).

APPENDIX A (continued)

8. \$ \_\_\_\_\_ Give the dollar volume of this business establishment for the year 1962.
9. Describe the problem of color changes in textile products
- \_\_\_\_ (1) Very serious problem
  - \_\_\_\_ (2) Moderately serious problem
  - \_\_\_\_ (3) Not a serious problem
  - \_\_\_\_ (4) Other \_\_\_\_\_
10. Check the factors below that are the most frequent causes of complaints about color changes in textile products. More than one factor may be checked.
- \_\_\_\_ (1) Perspiration
  - \_\_\_\_ (2) Antiperspirants and deodorants
  - \_\_\_\_ (3) Fume fading
  - \_\_\_\_ (4) Combination of perspiration and antiperspirants
  - \_\_\_\_ (5) Other causes or combinations of causes \_\_\_\_\_
11. Check the colors that you have observed to be most affected by acid conditions such as antiperspirants, perspiration and fume fading.
- |                 |                       |
|-----------------|-----------------------|
| ____ (1) Black  | ____ (6) Red          |
| ____ (2) Blue   | ____ (7) Violet       |
| ____ (3) Brown  | ____ (8) White        |
| ____ (4) Green  | ____ (9) Yellow       |
| ____ (5) Orange | ____ (10) Other _____ |
12. Check the fibers that you have observed to be most affected by color changes due to acid conditions such as antiperspirants, perspiration and fume fading.
- |                  |                       |
|------------------|-----------------------|
| ____ (1) Acetate | ____ (6) Orlon        |
| ____ (2) Cotton  | ____ (7) Rayon        |
| ____ (3) Dacron  | ____ (8) Silk         |
| ____ (4) Linen   | ____ (9) Wool         |
| ____ (5) Nylon   | ____ (10) Other _____ |

APPENDIX A (continued)

13. What parts of a garment are most affected by color changes?  
(1) \_\_\_\_\_ (3) \_\_\_\_\_  
(2) \_\_\_\_\_ (4) \_\_\_\_\_
14. List the garments that are most frequently damaged by color changes.  
(1) \_\_\_\_\_ (3) \_\_\_\_\_  
(2) \_\_\_\_\_ (4) \_\_\_\_\_
15. List the household textile products that are most frequently damaged by color changes.  
(1) \_\_\_\_\_ (3) \_\_\_\_\_  
(2) \_\_\_\_\_ (4) \_\_\_\_\_
16. Color changes in textile products are usually found to be due to  
\_\_\_\_ (1) Use of inferior types of dyes by the textile manufacturer  
\_\_\_\_ (2) Damages which occur in display and/or storage by the retailer  
\_\_\_\_ (3) Improper drycleaning procedures  
\_\_\_\_ (4) Consumer use and/or misuse  
\_\_\_\_ (5) Other \_\_\_\_\_
17. Do you think that additional consumer education would aid in decreasing the number of complaints related to color changes?  
\_\_\_\_ (1) Yes \_\_\_\_\_ (2) No  
If yes, indicate the two best ways of reaching consumers.  
(1) \_\_\_\_\_ (2) \_\_\_\_\_
18. The information given on this questionnaire is  
\_\_\_\_ (1) Taken from business records  
\_\_\_\_ (2) Estimated  
\_\_\_\_ (3) A combination of estimates and facts from business records

APPENDIX B

COVER LETTER FOR SURVEY QUESTIONNAIRE

April 6, 1963

Dear Sir:

Your business establishment is one of a sample of dry-cleaning establishments and leading retail groups being asked to help determine the answers to these questions:

1. How prevalent are consumer problems related to color changes in wearing apparel and household textiles?
2. How serious are these problems of color changes in textile products which occur in consumer use?

Color changes caused by perspiration, antiperspirants and fumes are of particular interest in this survey. The study is being conducted as part of our textile research program and with the co-operation of the National Institute of Dry-cleaning.

A relatively short amount of time was required for the filling out of the questionnaire in a test sample. I am hoping that you can find the time to complete and return this data to me as soon as possible. A stamped self-addressed envelope is provided for your convenience.

The data obtained will be handled in a confidential and impersonal manner so that no individual business establishment will be identified. Not only is your reply essential to this survey, but it may also aid in reducing the number of problems referred back to you by the consumer. Your co-operation in this study will be greatly appreciated.

Sincerely,

Frances F. Pollock  
Graduate Student

Pauline E. Keeney  
Professor of Home Economics

## APPENDIX C

NUMBER AND LOCATION OF DRYCLEANING ESTABLISHMENTS  
RESPONDING TO THE QUESTIONNAIRE

TABLE XXII

## NORTH CENTRAL REGION

	Less than 25,000	25,000 to 49,999	50,000 to 99,999	100,000 to 249,999	250,000 or more	Total
Illinois	1	0	0	0	0	1
Indiana	1	1	0	0	0	2
Iowa	2	0	1	1	0	4
Kansas	1	0	0	0	1	2
Michigan	1	0	0	1	0	2
Minnesota	0	0	0	0	0	0
Missouri	0	0	0	0	2	2
Nebraska	1	0	0	0	0	1
North Dakota	4	0	1	0	0	5
Ohio	1	0	2	0	1	4
South Dakota	1	0	0	0	0	1
Wisconsin	0	0	0	0	0	0
Total	13	1	4	2	4	24
Per cent	54.2	4.2	16.7	8.3	16.7	100

## APPENDIX C (continued)

TABLE XXIII

## NORTHEASTERN REGION

States	Less than 25,000	25,000 to 49,999	50,000 to 99,999	100,000 to 249,999	250,000 or more	Total
Connecticut	1	0	0	1	0	2
Maine	2	0	2	0	0	4
Massachusetts	0	1	0	0	0	1
New Hampshire	2	0	0	0	0	2
New Jersey	0	1	0	1	1	3
New York	1	0	1	1	0	3
Pennsylvania	1	0	0	1	1	3
Rhode Island	0	1	0	0	0	1
Vermont	0	0	0	0	0	0
Total	7	3	3	4	2	19
Per cent	36.8	15.8	15.8	21.1	10.5	100

## APPENDIX C (continued)

TABLE XXIV

## SOUTHERN REGION

States	Less than 25,000	25,000 to 49,999	50,000 to 99,999	100,000 to 249,999	250,000 or more	Total
Alabama	0	1	1	0	0	2
Arkansas	2	1	0	0	0	3
Delaware	1	0	0	0	0	1
Florida	1	1	0	0	0	2
Georgia	3	1	1	0	0	5
Kentucky	2	0	0	0	0	2
Louisiana	0	0	0	0	1	1
Maryland	0	0	0	0	2	2
Mississippi	0	2	0	0	0	2
North Carolina	0	0	2	0	0	2
Oklahoma	1	1	0	0	1	3
South Carolina	2	1	0	0	0	3
Tennessee	0	1	0	0	1	2
Texas	0	0	0	1	2	3
Virginia	1	0	1	1	0	3
West Virginia	0	0	0	0	0	0
Total	13	9	5	2	7	36
Per cent	36.1	25.0	13.9	5.6	19.4	100

## APPENDIX C (continued)

TABLE XXV

## WESTERN REGION

States	Less than 25,000	25,000 to 49,999	50,000 to 99,999	100,000 to 249,999	250,000 or more	Total
Arizona	0	0	0	0	2	2
California	0	1	0	1	0	2
Colorado	2	0	0	0	1	3
Idaho	1	0	0	0	0	1
Montana	1	0	2	0	0	3
Nevada	1	0	2	0	0	3
New Mexico	1	0	0	0	0	1
Oregon	1	0	0	0	1	2
Utah	2	0	1	0	1	4
Washington	2	0	0	0	2	4
Wyoming	2	0	0	0	0	2
Total	13	1	5	1	7	27
Per cent	48.1	3.7	18.5	3.7	25.9	100



## APPENDIX D

RESPONSES OF DRYCLEANING ESTABLISHMENTS ACCORDING TO  
INDUSTRIAL STATUS AND LOCATIONTABLE XXVI  
POPULATION OF CITIES

Industrial status of location of drycleaning establishments	Less than 25,000		25,000 to 49,999		50,000 to 99,999		100,000 to 249,999		250,000 or more	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Large industrial city (18)	0	0.0	1	5.6	3	16.7	3	16.7	11	61.1
Moderately industrial city (34)	8	23.5	6	17.6	9	26.5	4	11.8	7	20.6
Few small industries in city (38)	26	68.4	5	13.2	3	7.9	2	5.3	2	5.3
Nonindustrial city (16)	12	75.0	2	12.5	2	12.5	0	0.0	0	0.0
Total (106)	46	43.4	14	13.2	17	16.0	9	8.5	20	18.9

## APPENDIX D (continued)

TABLE XXVII

## METHODS OF CLAIM ADJUSTMENT

Industrial status of location of drycleaning establishments	Analysis						Other Methods of Adjustment		No response to question	
	Without laboratory		Use of Laboratory		National Institute of Drycleaning		Number	Per cent	Number	Per cent
	Number	Per cent	Number	Per cent	Number	Per cent				
Large industrial city (18)	7	38.9	2	11.1	16	88.9	5	27.8	0	0.0
Moderately industrial city (34)	11	32.4	3	8.8	26	76.5	14	41.2	0	0.0
Few small industries in city (38)	13	34.2	4	10.5	29	76.3	14	36.8	1	2.6
Nonindustrial city (16)	7	43.8	0	0.0	8	50.0	4	25.0	1	6.5
Total (106)	38	35.9	9	8.5	79	74.5	37	34.9	2	1.9

## APPENDIX D (continued)

TABLE XXVIII

## CONSUMER COMPLAINTS DUE TO COLOR CHANGE IN TEXTILE PRODUCTS

Drycleaners giving both total textile and color change complaints	Textile complaints		Color change complaints		Percentage of all textile complaints due to color change
	Number	Average per establishment	Number	Average per establishment	
Large industrial city (15)	1,625	108.3	307	20.5	18.9
Moderately industrial city (23)	1,863	81.0	545	23.7	29.3
Few small industries in city (29)	1,088	37.5	330	11.4	30.3
Nonindustrial city (11)	269	24.5	83	7.5	30.9
Total (78)	4,845	62.1	1,265	16.2	26.1

## APPENDIX D (continued)

TABLE XXIX

## CONSUMER COMPLAINTS DUE TO COLOR CHANGE WHICH REQUIRED MONETARY ADJUSTMENT

Drycleaners supply- ing figures for number color change complaints and number requiring adjustment	Consumer complaints in which damage was due to color change		Color change complaints requiring adjustment		
	Number	Average per establishment	Number	Average per establishment	Per cent
Large industrial city (16)	340	21.3	109	6.8	32.1
Moderately industrial city (33)	849	25.7	209	6.3	24.6
Few small industries in city (32)	368	11.5	109	3.4	29.6
Nonindustrial city (12)	95	7.9	35	2.9	36.8
Total (93)	1,652	17.8	462	5.0	28.0

## APPENDIX D (continued)

TABLE XXX

ANNUAL BUSINESS VOLUME NEEDED TO MAKE MONETARY ADJUSTMENTS  
FOR DAMAGES DUE TO COLOR CHANGES

Number of dryclean- ing establishments supplying figures for annual business volume and adjust- ments made in 1962	Annual business volume		Amount of adjustment paid to consumers		Per cent of business volume paid for adjustments
	Total	Average per establishment	Total	Average per establishment	
Large industrial city (16)	\$3,243,000.00	\$202,687.50	\$769.45	\$48.09	0.024
Moderately industrial city (31)	4,090,939.89	131,965.80	2,924.00	94.32	0.071
Few small industries in city (32)	2,328,700.00	72,771.88	1,400.25	43.76	0.060
Nonindustrial city (12)	670,000.00	55,833.33	382.50	31.88	0.057
Total (91)	\$10,332,639.89	\$113,545.49	\$5,476.20	\$ 60.18	0.053

## APPENDIX D (continued)

TABLE XXXI

DEGREE OF SERIOUSNESS ATTRIBUTED TO THE PROBLEM OF COLOR CHANGE

Industrial status of location of drycleaning establish- ments	Very serious		Moderately serious		Not serious		Other		No response	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Large industrial city (18)	3	16.7	10	55.6	4	22.2	2	11.1	0	0.0
Moderately industrial city (34)	5	14.7	14	41.2	14	41.2	1	2.9	2	5.9
Few small industries in city (38)	4	10.5	19	50.0	14	36.8	5	13.2	0	0.0
Nonindustrial city (16)	0	0.0	1	6.3	9	56.3	1	6.3	3	18.8
Total (106)	12	11.3	44	41.5	41	38.7	9	8.5	5	4.7

## APPENDIX D (continued)

TABLE XXXII

FACTORS MOST FREQUENTLY CAUSING COMPLAINTS REGARDING CHANGES IN TEXTILE PRODUCTS

Industrial status of location of drycleaning establishments	Perspiration		Anti-perspirants and deodorants		Fume fading		Combination of perspiration and anti-perspirants		Other causes		No responses	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Large industrial city (18)	9	50.0	8	44.4	11	61.1	11	61.1	7	38.9	0	0.0
Moderately industrial city (34)	17	50.0	10	29.4	26	76.5	15	44.1	14	41.2	0	0.0
Few small industries in city (38)	21	55.3	12	21.6	26	68.4	14	36.8	16	42.1	1	2.6
Nonindustrial city (16)	11	68.8	7	43.8	5	31.3	7	43.8	8	50.0	1	6.3
Total (106)	58	53.8	37	34.9	68	64.2	47	44.3	45	42.5	2	1.9

## APPENDIX D (continued)

TABLE XXXIII

COLORS REPORTED TO BE MOST AFFECTED BY ACID CONDITIONS

Colors	<u>Industrial status of location of drycleaning establishments</u>									
	Large Industrial city (18)		Moderately Industrial city (34)		Few small industries in city (38)		Nonindustrial city (16)		Total (106)	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Black	7	38.9	10	29.4	10	26.3	5	31.3	32	30.2
Blue	14	77.8	29	85.3	29	76.3	13	81.3	85	80.2
Brown	2	11.1	7	20.6	9	23.7	4	25.0	22	20.8
Green	9	50.0	17	50.0	19	50.0	10	62.5	55	51.9
Orange	3	16.7	3	8.8	8	21.1	2	12.5	16	15.1
Red	7	38.9	14	41.2	20	52.6	7	43.8	48	45.3
Violet	4	22.2	16	47.1	16	42.1	2	12.5	38	35.9
White	4	22.2	7	20.6	6	15.8	3	18.8	20	18.9
Yellow	2	11.1	5	14.7	2	5.3	2	12.5	11	10.4
Others	0	0.0	1	2.9	4	10.5	1	6.3	6	5.7
No response	0	0.0	1	2.9	3	7.9	1	6.3	5	4.7



## APPENDIX D (continued)

TABLE XXXIV

## FIBERS MOST AFFECTED BY COLOR CHANGES DUE TO ACID CONDITIONS

<u>Industrial status of location of drycleaning establishments</u>										
Fibers	Large Industrial city (18)		Moderately Industrial city (34)		Few small Industries in city (38)		Nonindustrial city (16)		Total (106)	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Acetate	13	72.2	27	79.4	27	71.1	10	62.5	77	72.6
Cotton	4	22.2	9	26.5	10	26.3	5	31.3	28	26.4
Dacron	5	27.8	6	17.6	5	13.2	4	25.0	20	18.9
Linen	0	0.0	1	2.9	6	15.8	1	6.3	8	7.5
Nylon	1	5.6	3	8.8	4	10.5	1	6.3	9	8.5
Orlon	1	5.6	6	17.6	5	13.2	3	18.8	15	14.2
Rayon	15	83.3	18	52.9	18	47.4	7	43.8	58	54.7
Silk	13	72.2	13	38.2	16	42.1	5	31.3	47	44.3
Wool	6	33.3	11	32.4	10	26.3	4	25.0	31	29.3
Others	1	5.6	1	2.9	3	7.9	0	0.0	5	4.7
No response	0	0.0	0	0.0	1	2.6	2	12.5	3	2.8

## APPENDIX D (continued)

TABLE XXXV

## PARTS OF GARMENTS MOST AFFECTED BY COLOR CHANGES

Parts of garments	Industrial status of location of drycleaning establishments									
	Large Industrial city (18)		Moderately Industrial city (34)		Few small industries in city (38)		Nonindustrial city (16)		Total (106)	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Back	4	22.2	4	11.8	5	13.2	3	18.8	16	15.1
Collar	5	27.8	3	8.8	8	21.1	4	25.0	20	18.9
Front	0	0.0	1	2.9	0	0.0	1	6.3	2	1.9
Neckline	2	11.1	7	20.6	4	10.5	1	6.3	14	13.2
Seat	1	5.6	1	2.9	0	0.0	0	0.0	2	1.9
Shoulders	5	27.8	9	26.5	6	15.8	2	12.5	22	20.8
Sides	1	5.6	0	0.0	1	2.6	0	0.0	2	1.9
Skirt	0	0.0	1	2.9	2	5.3	0	0.0	3	2.8
Sleeves	1	5.6	3	8.8	2	5.3	1	6.3	7	6.6
Underarm	15	83.3	29	85.3	29	76.3	15	93.8	88	83.0
Waist	2	11.1	2	5.9	2	5.3	3	18.8	9	8.5
Others	5	27.8	3	8.8	9	23.7	2	12.5	19	17.9
No response	2	11.1	3	8.8	3	7.9	1	6.3	9	8.5

## APPENDIX D (continued)

TABLE XXXVI

## GARMENTS REPORTED TO BE MOST FREQUENTLY AFFECTED BY COLOR CHANGES

Garments	Industrial status of location of drycleaning establishments									
	Large Industrial city (18)		Moderately Industrial city (34)		Few small industries in city (38)		Nonindustrial city (16)		Total (106)	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Blouses	10	55.6	15	44.1	11	28.9	4	25.0	40	37.7
Coats	0	0.0	2	5.9	2	5.3	3	18.8	7	6.6
Men's	1	5.6	0	0.0	1	2.6	0	0.0	2	1.9
Women's	1	5.6	0	0.0	0	0.0	2	12.5	3	2.8
Dresses	14	77.8	30	88.2	32	84.2	14	87.5	90	84.9
Pants	3	16.7	0	0.0	1	2.6	3	18.8	7	6.6
Shirts	2	11.1	1	2.9	3	7.9	2	12.5	8	7.6
Skirts	1	5.6	1	2.9	3	7.9	1	6.3	6	5.7
Suits	1	5.6	1	2.9	0	0.0	0	0.0	2	1.9
Men's	0	0.0	1	2.9	1	2.6	0	0.0	2	1.9
Women's	0	0.0	2	5.9	2	5.3	0	0.0	4	3.8
Sweaters	4	22.2	3	8.8	3	7.9	0	0.0	10	9.4
Others	2	11.1	1	2.9	3	7.9	2	12.5	8	7.6
No response	1	5.6	3	8.8	6	15.8	1	6.3	11	10.4

## APPENDIX D (continued)

TABLE XXXVII

## HOUSEHOLD TEXTILE ARTICLES REPORTED TO BE MOST AFFECTED BY COLOR CHANGES

Household textile articles	<u>Industrial status of location of drycleaning establishments</u>									
	Large Industrial city (18)		Moderately Industrial city (34)		Few small industries in city (38)		Nonindustrial city (16)		Total (106)	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Curtains	0	0.0	7	20.6	4	10.5	3	18.8	14	13.2
Draperies	11	61.1	25	73.5	29	76.3	10	62.5	75	70.8
Rugs	0	0.0	0	0.0	1	2.6	0	0.0	1	.9
Slip covers	2	11.1	7	20.6	8	21.1	2	12.5	19	17.9
Spreads	1	5.6	5	14.7	5	13.2	1	6.3	12	11.3
Upholstery	0	0.0	1	2.9	0	0.0	0	0.0	1	.9
Others	0	0.0	0	0.0	2	5.3	2	12.5	4	3.8
No response	5	27.8	6	17.6	4	10.5	5	31.3	20	18.9

## APPENDIX D (continued)

TABLE XXXVIII

REPORTED CAUSES OF COLOR CHANGES IN TEXTILE PRODUCTS  
ACCORDING TO INDUSTRIAL STATUS AND LOCATION

Causes	<u>Industrial status of location of drycleaning establishments</u>									
	Large Industrial city (18)		Moderately Industrial city (34)		Few small industries in city (38)		Nonindustrial city (16)		Total (106)	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Improper dyes used by manufacturer	10	55.6	22	64.7	28	73.7	12	75.0	72	67.9
Damages in display and storage by retailer	5	27.8	10	29.4	16	42.1	3	18.8	34	32.1
Improper drycleaning	1	5.6	4	11.8	4	10.5	0	0.0	9	8.5
Consumer use and/or misuse	8	44.4	20	58.8	18	47.4	7	43.8	53	50.0
Other causes	3	16.7	15	44.1	6	15.8	3	18.8	27	25.5
No response	1	5.6	2	5.9	4	10.5	3	18.8	10	9.4

## APPENDIX D (continued)

TABLE XXXIX

USEFULNESS OF ADDITIONAL CONSUMER EDUCATION IN EFFECTING  
A DECREASE IN THE NUMBER OF COLOR CHANGE COMPLAINTS

Industrial status of location of drycleaning establishments	Will decrease complaints		Will not decrease complaints		No response	
	Number	Per cent	Number	Per cent	Number	Per cent
Large Industrial city (18)	17	94.4	1	5.6	0	0.0
Moderately Industrial city (34)	32	94.1	2	5.9	0	0.0
Few small industries in city (38)	29	76.3	8	21.1	1	2.6
Nonindustrial city (16)	13	81.3	2	12.5	1	6.3
Total (106)	91	85.9	13	12.3	2	1.9