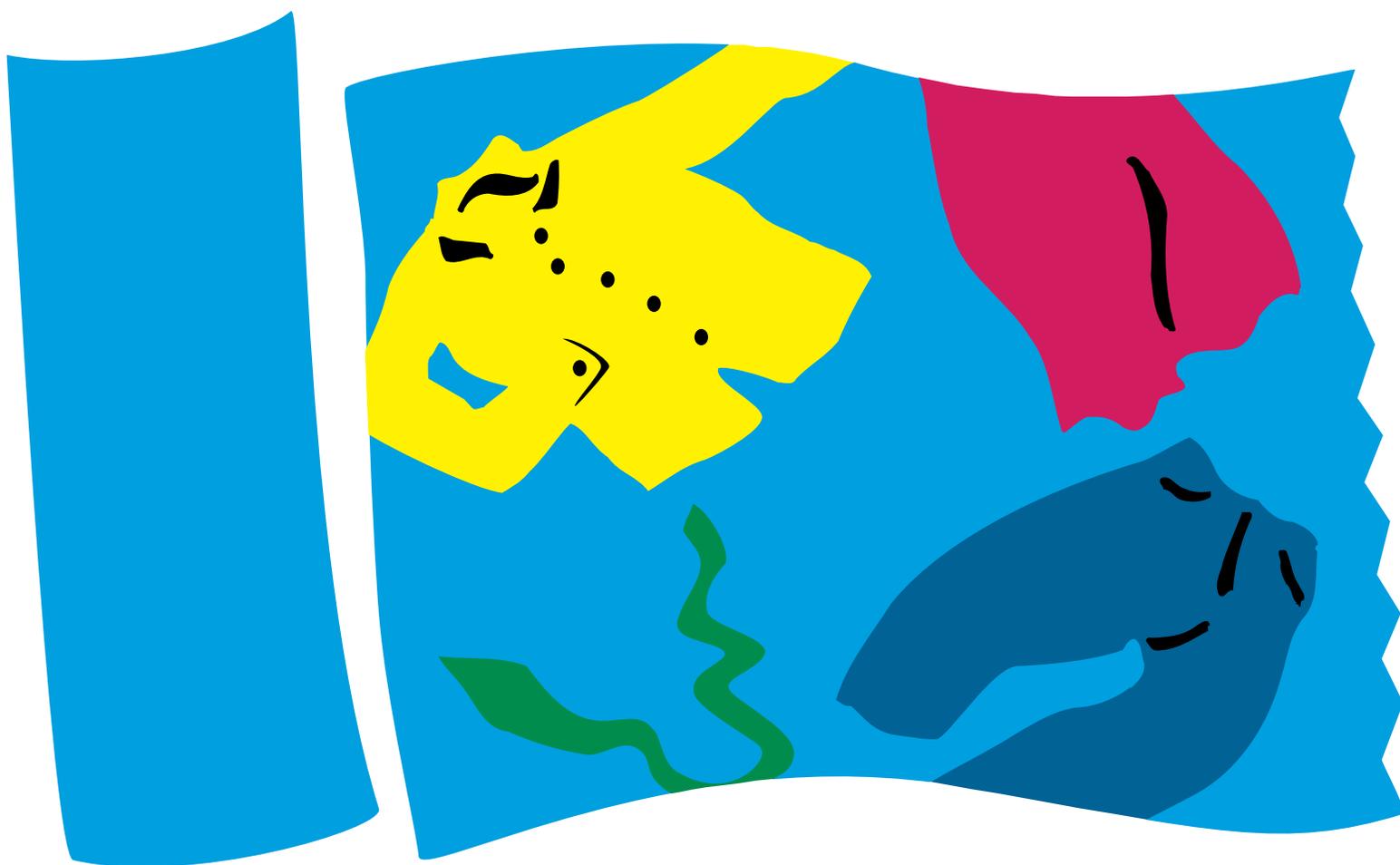




Proceedings

Apparel Care and the Environment

Alternative Technologies and Labeling





Apparel Care and the Environment

Alternative Technologies and Labeling



Prepared by Eastern Research Group, Inc. for the Office of Pollution Prevention and Toxics, U.S. Environmental Protection Agency. Points of view expressed in this proceedings document do not necessarily reflect the view of policies of the U.S. Environmental Protection Agency or any of the contributors to this publication. Mention of trade names and commercial products does not constitute endorsement of their use.

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Foreword

Representatives of textile and apparel manufacturers, the dry cleaning industry, the U.S. Environmental Protection Agency (EPA), international standards organizations, and others gathered in Washington, DC on September 9-10, 1996, for "Apparel Care and the Environment: Alternative Technologies and Labeling." The conference was co-sponsored by the American Apparel Manufacturers Association, The American Association of Textile Chemists and Colorists, the American Textile Manufacturers Institute, the American Society for Testing and Materials Committee D13 on Textiles, the Fabricare Legislative and Regulatory Education Organization, the Professional Wet Cleaning Partnership, and EPA. Approximately 90 people attended.

"Apparel Care and the Environment" brought together key stakeholders to learn about developments in alternative technologies and care labeling, and to discuss the focus of future efforts. Participants shared a common goal: to reduce the impact of apparel care on the environment. Although most dry cleaners currently use the toxic chemical perchloroethylene to clean garments, alternative technologies such as wet cleaning are emerging and becoming commercially viable. Wet cleaning is a professional garment cleaning process that uses the controlled application of soap and water. One barrier to the expansion of alternative technologies is current garment care labeling practices which specify dry clean only for most garments requiring professional cleaning. If a garment labeled "dry clean only" were damaged by a professional cleaner using a wet cleaning process, the cleaner would be liable for the damage. Revisions to the Federal Trade Commission's (FTC) Care Labeling Rule are being considered to address such issues.

The conference was divided into three sessions, each of which was followed by a discussion period. The first session focused on EPA's initiatives in partnership with industry. European developments on wet cleaning, other alternative technologies, and care labeling were discussed during the second session, which also featured results from a U.S. wet cleaning demonstration project. The third session covered presentations on care labeling by FTC, textile and apparel manufacturers, the fabricare industry, a retailer, and a consumer representative. The conference concluded with a facilitated discussion and development of an action plan. These proceedings contain transcribed presentations, copies of the papers presented during the conference, and a summary of the discussion sessions.



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Agenda

Monday, September 9, 1996

- 9:30 Registration and Coffee
- Session I: **INTRODUCTION AND PROGRAM**
Moderator: *Ohad Jehassi*
U.S. Environmental Protection Agency (EPA)
- 10:30 **Welcome and Introduction**
William H. Sanders, Director, Office of Pollution Prevention and Toxics, EPA
- 10:40 **EPA's Design for the Environment Program for the Dry Cleaning Industry**
Ohad Jehassi, EPA
- 11:00 **EPA's Cleaner Technologies Substitutes Assessment for the Dry Cleaning Industry: A Real World Industrial Ecology Example**
Joseph Breen, EPA
- 11:10 **EPA's ORD Research Program on Alternative Textile Care Technologies**
Perry Grady, North Carolina State University
Charles Riggs, Texas Woman's University
- 11:40 **Discussion**
- 12:30 **LUNCH** (on your own)
- Session II: **TEXTILE CARE TECHNOLOGY DEVELOPMENTS**
Moderator: *Manfred Wentz*, Fabricare Legislative and Regulatory Education Organization (FLARE)/American Association of Textile Chemists and Colorists (AATCC)
- 2:00 **Textile Care Research Programs in Germany**
Josef Kurz, Hohenstein Institute, Boennigheim, Germany
- 2:20 **Textile Care Technology Spectra and Care Labeling Issues**
Manfred Wentz, FLARE/AATCC
- 2:40 **Report on Professional Wet Cleaning in Europe**
Kaspar D. Hasenclever, Kreussler, Wiesbaden, Germany
- 3:00 **BREAK**
- 3:20 **Report on the European Wet Cleaning Committee**
Walther den Otter, TNO Cleaning Techniques Research Institute, Delft, The Netherlands
- 3:40 **Report on the European Care Labeling Status**
Helmut Kruessmann, GINETEX-wfk, Krefeld, Germany
- 4:00 **Results and Conclusions From Wet Cleaning Demonstration Projects**
Jo Patton, Center for Neighborhood Technology (CNT)
- 4:20 **Discussion**
- 5:20 **End of First Day's Sessions**



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Agenda (Continued)

Tuesday, September 10, 1996

- Session III: CARE LABELING ISSUES**
Moderator: *Jo Patton, CNT*
- 8:30 **FTC Care Labeling Revisions**
Connie Vecellio, Federal Trade Commission
- 8:50 **Status Report From ASTM's Care Labeling Committee**
Jo Ann Pullen, American Society for Testing and Materials
- 9:10 **Care Labeling and the Textile Industry**
Kay M. Villa, American Textile Manufacturers Institute
- 9:30 **Care Labeling and the Apparel Industry**
Carl Priestland, American Apparel Manufacturers Association
- 9:50 **One Retailer's Perspective on Care Labeling, Consumers, and the Environment**
Jennifer Holderness, Gap, Inc.
- 10:10 **BREAK**
- 10:30 **Care Labeling and the Fabric Care Industry**
Mary Scalco, International Fabricare Institute
- 10:50 **Care Labeling and Consumers**
Nancy Cassill, University of North Carolina-Greensboro
- 11:10 **Discussion**
- 11:50 **Summary and Action Plan**
Facilitator: *Jan Connery, Eastern Research Group*
- 1:10 **End of Conference**

This meeting is supported by the U.S. Environmental Protection Agency's Design for the Environment Program.





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AMERICAN APPAREL MANUFACTURERS ASSOCIATION

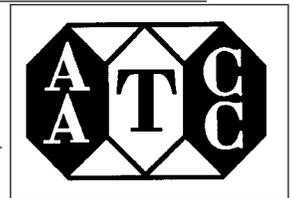
The mission of AAMA is to help create an environment in which the U.S. apparel industry can operate competitively and profitably in a global economy. Association objectives to accomplish this mission include: providing information and educational services to the membership to enable it to respond to a changing apparel environment; educating and informing the public, decision makers, and the media regarding industry trends, issues, and concerns; providing a forum for members to meet and exchange views; promoting awareness of and responsiveness to the legitimate needs and concerns of apparel customers and consumers; representing the interests of the membership on legislative, regulatory, and administrative issues; and anticipating emerging issues affecting the industry.



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AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

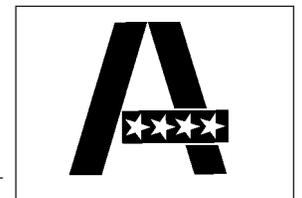
Established in 1921, AATCC is a technical and scientific professional society dedicated to the advancement of knowledge relating to the application and use of dyes and chemicals in the textile industry. The association encourages research work on chemical processes and materials and establishes channels to increase interchange of professional knowledge among members.



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AMERICAN TEXTILE MANUFACTURERS INSTITUTE

ATMI is the national trade association for the domestic textile industry. Member companies operate in more than 30 states and process approximately 80 percent of all textile fibers consumed by plants in the United States. The industry employs 656,000 people. ATMI's activities encompass government relations, international trade, product and member services, communications, and economic information.



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AMERICAN SOCIETY FOR TESTING AND MATERIALS, COMMITTEE D13 ON TEXTILES

ASTM D13 develops standard test methods, specifications practices, and guides for textiles and related material including fibers, yarns, fabrics, apparel, care labeling, ropes, tire cord, pile floor coverings, home furnishings, nonwoven fabrics and subassemblies.

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Sponsors (Continued)

FABRICARE LEGISLATIVE AND REGULATORY EDUCATION ORGANIZATION

FLARE is a national, grass-roots organization composed of volunteers from within the fabric care industry. FLARE's mission is to foster an environment for the Fabric Care Industry to prosper. The organization seeks to accomplish its mission by providing a communications channel for the fabric care industry to facilitate discussion and education amongst industry members, regulators, legislators, and the general public on fabric care issues and on the benefits of fabric care to society.



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PROFESSIONAL WET CLEANING PARTNERSHIP

PWCP has three goals: to encourage the development and demonstration of professional wet cleaning methods; to promote increased professional wet cleaning of clothes that previously would have been dry cleaned; and to assist those presently in the clothes care industry to survive and prosper in the face of heightened regulatory pressures. Participating organizations in the Partnership include: the International Fabricare Institute, Greenpeace, the Neighborhood Cleaners Association, the Center for Neighborhood Technology, FLARE, Massachusetts Toxics Use Reduction Institute, the Federation of Korean Drycleaning Associations, and the Union of Needletrades, Industrial & Textile Employees.



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U.S. ENVIRONMENTAL PROTECTION AGENCY

EPA, through its Design for the Environment (DfE) Program, is working with a variety of industries—from dry cleaners to printers to metal platers—to encourage the design of safer processes and products by eliminating or minimizing pollution. DfE conducts collaborative studies and shares research with government agencies, industry groups, public interest groups, universities, and others. The overall mission of DfE is to cultivate pollution prevention strategies that integrate both environmental and economic objectives. In this way, a critical link can be forged between the need to protect the environment and economic productivity. As part of its DfE program, EPA formed a partnership with the dry cleaning industry and public interest groups in 1991 to minimize perchloroethylene exposures and evaluate alternative technologies.



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Apparel Care and the Environment

Alternative Technologies and Labeling



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Apparel Care and the Environment

Alternative Technologies and Labeling



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Apparel Care and the Environment

Alternative Technologies and Labeling



Session I

Welcome and Introduction

William H. Sanders

*Director, Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency*

Dr. Sanders is Director of the U.S. Environmental Protection Agency's (EPA's) Office of Pollution Prevention and Toxics (OPPT). OPPT plays a lead role in promoting pollution prevention both within the Agency and with states, tribes, communities, and industry. Previously, Dr. Sanders served as the Agency's Senior Executive for Resources Management Training in the Office of Administration and Resources Management and as the Director of EPA Region 5's Environmental Sciences Division. Dr. Sanders holds a Ph.D. in Environmental and Occupational Health Sciences from the University of Illinois, an M.S. in Management of Public Service in Quantitative Methods from DePaul University, and a B.S. in Civil Engineering from the University of Illinois.

Welcome to "Apparel Care and The Environment: Alternative Technologies and Labeling."

The U.S. Environmental Protection Agency's (EPA's) Office of Pollution Prevention and Toxics (OPPT) is proud to co-sponsor this conference and bring together members of the textile, apparel, and cleaning industries to discuss the issue of reducing the environmental impacts of apparel care.

Our goal for this conference is two-fold:

1. To inform you about current alternative technologies and care labeling issues that may affect your industry.
2. To foster a working relationship among all of you that will lead to positive environmental changes in your industry.

An additional challenge for us over the next 2 days is to map out an action plan that will ensure protection for the environment and continued success for the apparel care industry.

More broadly, we hope this meeting will help the apparel care industry in their continuing quest to provide high-quality, cost-efficient, and environmentally sound goods and service to their customers.

We've got a full agenda ahead for the next 2 days. In the first session this morning, we will review what EPA has accomplished in the past few years in cooperation with the dry cleaning industry, and current projects that are underway.

- I will be speaking to you about the Design for the Environment (DfE) Program.

- Ohad Jehassi will provide details about the Design for the Environment Program's Dry Cleaning Project.
- Joseph Breen will give a report on one aspect of the Dry Cleaning Project, the Cleaner Technologies Substitutes Assessment.
 - Over the past few years, EPA has used this tool to evaluate the cost, performance, and environmental and health risks of individual technologies as well as the respective "trade-offs" for a given industry.
- EPA has also sponsored a research program on alternative textile care technologies. Perry Grady (North Carolina State University) and Charles Riggs (Texas Woman's University) will share their research findings with us.

In this afternoon's session, we are going to discuss recent developments in textile care and begin to address care labeling issues.
- International colleagues will share developments that have emerged and techniques that have been tried in Germany, the Netherlands, and France.
- Jo Patton of the Center for Neighborhood Technology will share the results of wet cleaning demonstration projects conducted here in the United States.

Tomorrow we explore in depth one of the main issues of this conference—Care Labeling:

- Representatives from the Federal Trade Commission; the textile, apparel, and fabric care industries; and retailers and consumers will all share their perspectives on this issue.
- With the help of a facilitator, we will be summarizing the meeting and developing an action plan for the future.

While we do not necessarily expect to reach any final decisions on the complicated issue of care labeling, it is our hope that the perspectives presented here and the discussions that follow will help define the issues involved and focus our efforts. In addition, we hope that all of you will take advantage of the contacts made here and continue to work together in good faith toward the common goal of a healthy environment.

And now, I'd like to briefly share with you some of the history and background of OPPT's involvement with the apparel care industry.

In 1990, OPPT was looking for ways to streamline the regulatory risk process. In the past, this process relied heavily on controlling the release of specific chemicals into a particular environmental media—water, air, or land. With this approach, EPA had accomplished much, but along the way some drawbacks had emerged:

- Regulations sometimes proved to be burdensome, inflexible, and resource intensive for both government and industry.
- While some regulations solved one environmental problem, they sometimes created a different problem at the same time, often by transferring pollution from one media to another.
- Some industries replaced regulated chemicals with other nonregulated chemicals that were also hazardous to the environment.

At the same time, however, industry was responding to regulations in positive, proactive ways:

- A number of companies discovered that pollution prevention was a cost-effective way to comply with regulations and help the environment. Many businesses devised innovative ways to substitute, reduce, or eliminate toxic feedstocks and waste streams.
- Industries that were already designing products for marketability and safety began to “design for recyclability” and “design for the environment” as well.

In the early 1990's, the Office of Pollution Prevention and Toxics established its DfE Program.

- DfE was created to help the private sector develop alternative approaches to environmental management as well as to leverage government resources to accomplish public sector environment goals.
- DfE has worked toward these goals through voluntary partnerships with industries such as printing, metal finishing, and, of course, dry cleaning.

In its partnerships with industry, EPA's Design for the Environment Program systematically:

- Identifies alternative technologies, products, and processes for preventing pollution.
- Evaluates and compares the risk, performance, and cost tradeoffs of these alternatives.
- Disseminates this information to the industry community and other interested parties.

In addition to these voluntary partnerships, EPA's Design for the Environment Program sponsors two other key initiatives:

- DfE's Institutional Projects work with the accounting, insurance, and finance industries to ensure that the environmental and economic savings of implementing innovative pollution prevention methods are adequately measured so they can be factored into business planning.
- DfE's Green Chemistry program, through research, review, and curriculum development, recognizes and supports fundamental breakthroughs in chemistry that are cost-effective, useful to industry, and prevent pollution.

The Design for the Environment Program does not, however, recommend specific alternatives. Instead, it provides decision-makers with information, tools, and incentives so that they can make informed decisions that integrate risk, performance, and cost concerns.

There are many potential benefits to DfE projects, including:

- Consumers and workers benefit from reduced health, safety, and ecological risks.
- Preventing pollution can help an industry's bottom line. A successful project reduces regulatory burden, reduces liability and insurance costs, and at the same time it increases efficiency, increases customer acceptance, and improves worker moral and productivity.
- The relationships developed during the cooperative effort of a DfE project can, in the future, contribute to

increased efficiency in handling environmental concerns.

In the 1990's, businesses face many competing demands—keeping costs low and quality high, competing in the global marketplace, and meeting consumer preferences for environmentally friendly goods and services. EPA's Design for the Environment Program strives to assist companies in meeting all of

these goals while at the same time lessening an industry's impact on the environment. Through this conference and other key initiatives, we hope to help all of you, and the public at large, become more aware of technologies and issues that are shaping the garment care industry. It is our hope that armed with this information, you can make decisions that are both good for business and good for the environment.

EPA's Design for the Environment (DfE) Program for the Dry Cleaning Industry

Ohad Jehassi

U.S. Environmental Protection Agency

Mr. Jehassi is an economist currently working with the U.S. Environmental Protection Agency's (EPA's) Administrator's Office. In this role, he evaluates the effectiveness of EPA's voluntary and partnership programs. Formerly with EPA's Design for the Environment Program, he managed the development of the dry cleaning project. Mr. Jehassi's experience includes work on various regulations covering lead, cadmium, and formaldehyde, and the development of models predicting the effects of risk communication on consumer behavior. He holds an M.S. in Public Management and a B.S. in Economics from Carnegie Mellon University.

I am honored to be here today to speak to you about EPA's Design for the Environment Dry Cleaning Project. Dr. William Sanders has given us an interesting glimpse inside the Design for the Environment Program's history, initiatives, and goals.

In my work on just one of these initiatives, the Dry Cleaning Project, I have witnessed many positive changes—and encountered a few obstacles as well—during the Project's 4-year quest to explore environmentally responsible cleaning methods.

In my remarks today, I would like to discuss EPA's role in these changes. EPA initially became involved with the dry cleaning industry because of its use of perchloroethylene (perc), a chemical that has been designated as a hazardous air pollutant under the Clean Air Act. Perc has been found at the highest concentration in urban outdoor air, the indoor air of cleaning shops and nearby residences, the homes of dry cleaning workers and customers, as well as in the food, soil, and groundwater near dry cleaning sites.

The dry cleaning industry's use of perc affects a large number of people. In fact, with more than 30,000 commercial dry cleaning shops in neighborhoods and malls across the country, dry cleaners make up one of the largest groups of chemical users that come into direct contact with the general public.

From the beginning, EPA recognized that the dry cleaning industry consists primarily of small, marginally profitable businesses that are least able to absorb the impact of increasing regulations. With these facts in mind, EPA forged a voluntary partnership with the industry to reduce exposure to dry cleaning sol-

vents through safer work practices and alternative technologies.

Toward this end, the Project's primary objectives are to:

- Identify and evaluate pollution prevention options
- Empower dry cleaners and the public with information
- Provide incentives for dry cleaners and the public to change behavior

The birth of the Dry Cleaning Project marked a fundamental shift in the way EPA does business. EPA had never before attempted to work together so closely with an industry. In addition, rather than reducing risk through command and control regulation, EPA used its resources to support innovation and research and development. This project also marks the first time EPA has convened a group as diverse as the Dry Cleaning Project's stakeholders.

The partners in this project include:

- Environment Canada
- Trade associations
- Labor unions
- Chemical companies
- Government purchasing authorities
- Academia
- Environmental and consumer groups

The Dry Cleaning Project has accomplished much since its inception in 1992. The project has:

- Formed partnerships among industry, labor, environmental, and consumer groups. Among these partners are the co-sponsors of this conference, and I would like to take this opportunity to thank:
 - American Apparel Manufacturers Association (AAMA)
 - American Association of Textile Chemists and Colorists (AATCC)
 - American Textile Manufacturers Institute
 - American Society for Testing and Materials (ASTM)
 - Fabricare Legislative and Regulatory Education (FLARE)
 - Professional Wet Cleaning Partnership (list partners)
- Jointly identified and evaluated alternative technologies

The alternative technologies identified have included wet cleaning, a process of controlled application of soap and water, and alternative solvent-based cleaning. The Project is also examining other alternative cleaning methods, including liquid carbon dioxide and ultra-sonic technologies. Dr. Joseph Breen will discuss the technologies assessed in the Cleaner Technologies Substitutes Assessment, or CTSA, in more detail immediately following my remarks.

- Successfully tested alternative wet cleaning methods
In 1993, in preparation for producing the CTSA, EPA compared the costs and performance of perc-based dry cleaning against a cleaning method known as multiprocess wet cleaning. Findings from this preliminary, short-term study encouraged us to further research wet cleaning.
- Established demonstration sites
Two machine wet cleaning demonstration sites, one in Chicago and the other in Los Angeles have been established to collect information on performance, cost, and customer satisfaction. The sites mirror typical neighborhood dry cleaning shops and offer dry cleaners the opportunity to observe wet cleaning under long-term “real-world” conditions. This afternoon, Jo Patton from the Center for

Neighborhood Technology will present some of the results of these demonstration projects.

- Developed a training program for dry cleaners
EPA is sponsoring the development of a curriculum and related workshops to reduce the use of perc. Focusing on alternative cleaning technologies, especially machine wet cleaning, this course also covers economics, worker health and safety, and liability issues.
- Outreach activities
To educate consumers and dry cleaners about ways to reduce the risks associated with dry cleaning, DfE and its project partners have created a variety of informational materials. These materials include brochures, fact sheets, case studies, televideo conferences, educational videos, and pollution prevention manuals.
- As a direct result of the project’s involvement in wet cleaning, nearly 100 shops that offer wet cleaning services have opened or made the switch to wet cleaning in the past 18 months.
- Initiated changes in care labels to allow for alternative care methods

Early on in the evaluation process, the Dry Cleaning Project recognized that one of the key obstacles to implementing alternative, environmentally friendly technologies is care labeling. Accordingly, the DfE Dry Cleaning Project asked the Federal Trade Commission to revise its Care Labeling Rule to require textile manufacturers to explicitly state whether a garment can be safely cleaned by solvent-based methods, water-based methods, or both. We believe this change is necessary to advance the use of water-based cleaning methods.

The Care Labeling Rule now states “*if either washing or dry cleaning can be used on the product, the label need have only one of these instructions.*” We believe that amending the rule would allow consumers, as well as professional cleaners, to make more informed choices as to whether garments can be dry or wet cleaned. It would also encourage the use of water-based cleaning methods without the threat of resulting garment damage and subsequent damage claims on professional cleaners.

There are also a number of ongoing activities:

- U.S. Small Business Administration Workshops to be held across the country

- U.S. Navy/Army Testing Program will test the wet cleaning process on “dry clean only” military garments

In the next day and a half we will be hearing different perspectives on the care labeling issue and hopefully reaching some agreements on how best to address the questions and concerns of everyone here today.

I hope that my remarks this morning have provided all of you with an adequate overview of the DfE Dry Cleaning Project. EPA's Office of Pollution Prevention and Toxics is committed to helping the garment care

industry continue its history of customer satisfaction during this time of change. Working together, we can reduce the risks of dry cleaning solvents and provide a safer, healthier environment for dry cleaners and their customers. All of the apparel care representatives here today — from textile manufacturers, trade associations, the Federal Trade Commission, researchers, to our European colleagues — have a role to play in preventing pollution. We hope this meeting will serve as a constructive forum to exchange ideas about where we now stand, and what is indeed possible for the future.

1



Design for the Environment Dry Cleaning Project Partnerships for a Cleaner Future

2



Technical Work

Goal: A Cleaner Technology Substitutes Assessment (CTSA) provides a comparative evaluation of alternatives in terms of risk, performance, cost, and other environmental effects to prevent pollution, reduce risk, and improve economic productivity



3



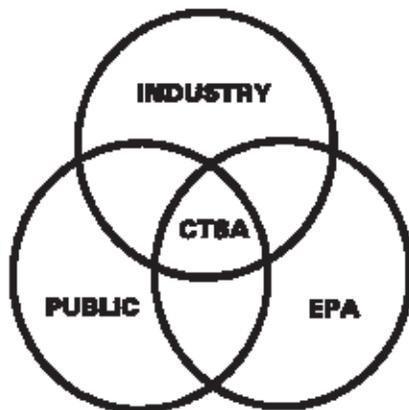
Dry Cleaning Project

- ◆ **Partnership formed in May 1992**
- ◆ **Goal: Reduce exposure to dry cleaning solvents**
- ◆ **Objectives:**
 - **Identify and evaluate pollution prevention options**
 - **Empower dry cleaners and public with information**
 - **Provide incentives for dry cleaners and public to change behavior**

4



Stakeholders



- ◆ **Amalgamated Clothing and Textile Workers Union**
- ◆ **Canadian Fabricare Association**
- ◆ **Consumers Union**
- ◆ **Dow Chemical Company**
- ◆ **Environment Canada**
- ◆ **Greenpeace**
- ◆ **Halogenated Solvents Industry Alliance**
- ◆ **International Fabricare Institute**
- ◆ **Massachusetts Toxics Use Reduction Institute**
- ◆ **Neighborhood Cleaners Association**
- ◆ **U.S. Environmental Protection Agency**

5



Sponsors

- ◆ **American Apparel Manufacturers Association (AAMA)**
- ◆ **American Association of Textile Chemists and Colorists (AATCC)**
- ◆ **American Textile Manufacturers Institute (ATMI)**
- ◆ **American Society for Testing and Materials, Committee D13 on Textiles (ASTM)**
- ◆ **Fabricare Legislative and Regulatory Education Organization (FLARE)**
- ◆ **Professional Wet Cleaning Partnership (PWCP)**
- ◆ **U.S. Environmental Protection Agency (EPA)**

6



Project Accomplishments

- ◆ **Formed partnerships among industry, labor, environmental, and consumer groups**
- ◆ **Jointly identified and evaluated alternative technologies**
- ◆ **Successfully tested alternative wet cleaning methods**
- ◆ **Established alternative technology demonstration sites**

7



Project Accomplishments

- ◆ **Developed training curriculum for dry cleaners**
- ◆ **Outreach activities**
- ◆ **More than 80 wet cleaning shops have opened in North America in the last 18 months**
- ◆ **Initiated change in apparel care labels**

8



Ongoing Activities

- ◆ **SBA workshops**
- ◆ **U.S. Navy/Army testing program**

EPA's Cleaner Technologies Substitutes Assessment for the Dry Cleaning Industry: A Real World Industrial Ecology Example

Joseph Breen

U.S. Environmental Protection Agency

Dr. Breen is Chief of the U.S. Environmental Protection Agency's (EPA's) Design for the Environment Program within the Office of Pollution Prevention and Toxics (OPPT). OPPT plays a lead role in promoting pollution prevention both within the Agency and with states, tribes, communities, and industry. Prior to assuming his present duties as head of the Design for the Environment Program, Dr. Breen served as Chief of the Field Studies Branch and Industrial Chemistry Branch in OPPT. Dr. Breen earned a Ph.D. in chemistry from Duke University.

I'd like to add an industrial ecology perspective before I get into a discussion of the Cleaner Technology Substitutes Assessment (CTSA). What I want to share with you is this graph (slide 2). It's from the President's Council on Sustainable Development and it lays out a 50-year strategic plan for technology development at the end of the 20th century and the first part of the 21st century. What it shows are four lines, one each for remediation and restoration, control, monitoring and assessment, and avoidance or pollution prevention. The point is that at the end of the 20th century, we're spending a lot of effort and monies on remediation, restoration, and control. The long-term strategic plan, however, is to have pollution prevention be the paradigm in order to avoid having to expend major effort on remediation and restoration or, for that matter, on control. If you don't create the pollution in the first place, then you don't have the cost of cleaning it up, controlling it, or the liabilities associated with it.

The Dry Cleaning Project is an excellent illustration of industrial ecology because, although it started out dealing with the issue of environmental and worker exposures to perchloroethylene (perc), we now have new technologies that are coming forward and we've even changed the people that are participating in the process. It's not only the small "mom and pop" dry cleaners, the franchise people, or the hardware and the solvents people who are involved in this, but also we're now talking to the people who actually produce the garments themselves and to the people who produce the textile fibers from which the garments are made. This is part of the ecological web notion here in an

industrial setting. We are trying to influence the chemistry of the polymers and the surface finishes used in and on the garments in order to make them more amenable to pollution prevention technologies for the fabric care industry. I think that is pretty exciting.

Just to quickly reiterate the Design for Environment (DfE) vision, it's the simple notion of taking classical cost and performance parameters as a basis for decision-making and including an environmental component. The mission of our program is to use the Office of Pollution Prevention and Toxics (OPPT) risks management expertise to help inform business decisions to affect behavioral change. As Bill Sanders, the Director of OPPT, has indicated in his remarks, one of the hallmarks of the DfE program is that it is a voluntary program involving partnerships to empower the participants to move forward toward pollution prevention. Ohad Jehassi has indicated that the stakeholders in the Dry Cleaning Project include not only the U.S. Environmental Protection Agency (EPA) and industry, but also the public sector and environmental and labor groups as well.

Which brings me to what I have been charged with, to provide you with a thumbnail sketch of what a CTSA is all about. A CTSA is a systematic comparison of the performance cost and human health and environmental risks associated with chemicals, processes, and technologies. The goal is to evaluate the traditional as well as the alternative technologies, to evaluate substitutes, and to evaluate control options.

The idea is to lay out the tradeoffs among the options in order to facilitate informed decisions. It turns out that if you look at what is required to go into a CTSA, you create a rather daunting matrix of modules. They include basic chemical information, human health and hazard summaries, the environmental hazard summaries, and the market information process description. The modules also include exposure issues that get compiled into a risk assessment including safety and process hazard issues, evaluation of the P2 options, and some ancillary information on the regulatory status and performance and social costs and benefits. Completing this matrix is a rather formidable task. In this particular case where we are looking at substitute technologies, we take all of those module elements and array them for the various substitute technologies in a data matrix.

In the case of the dry cleaning technology assessment, we've been charged with taking the existing technologies and some newly available ones to fill in the matrix that I've just presented. The more challenging aspect is to also get a handle on those technologies under development and for which the data base is extremely limited. These new technologies include efforts to deal with petroleum solvents, various fluorocarbons, and liquid carbon dioxide. What's unique or exciting, for me at least, is the emergence by virtue of this process here in the United States of us giving serious consideration to substitutes for traditional dry cleaning. We've been working on the wet cleaning processes with our colleagues here in the United States and in Canada, and we've had more recent efforts with the people in Europe such as in Germany. Again, the challenge is to pull together the information which, in many cases, is somewhat limited because the technologies are fairly new.

What Lynn Blake-Hedges, the CTSA Project Manager, and the Dry Cleaning Work Group at EPA are doing is assembling a table that looks something like this. It takes all of the modules I showed in the previous graphic (slide) and fills in the boxes to make a comparison across the technologies. The objective of the comparison is *not* to dictate what technology to choose. The objective is to provide the information so that informed decisions can be made. A decision one individual might make may differ from another individual, depending on their particular circumstance.

Circumstances such as the capital investment they're confronted with, and whether they've recently made investments in a particular technology or not.

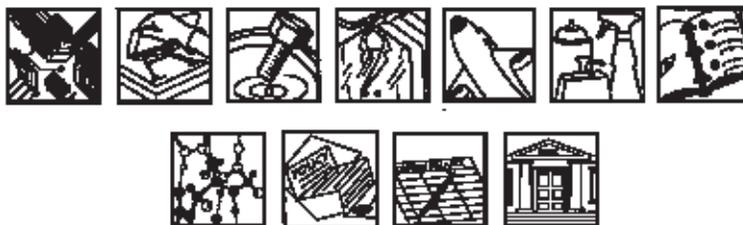
Once the CTSA is completed, the challenge is to communicate it to the industry and to consumers. Lynn Blake-Hedges and the Work Group are working diligently to integrate Phase I, which is the CTSA for the perchloroethylene (perc) and petroleum solvents. The Phase II document covers all of the other technologies listed in the matrix. The timetable is to complete that process by the end of the year. This particular document has to go into peer review, and we look for that to happen this winter. We're optimistic we will release the integrated Phase I and Phase II CTSA sometime in late spring of 1997. For those of you that have been involved in the process, you know there has been some difference of opinion associated with the CTSA, particularly in the area of risk characterization. We continue to work with Bill Sanders and Lynn Blake-Hedges to come up with an appropriate presentation of the risk characterization, in order to meet our objectives.

I must tell you, as someone who has been at EPA since 1977, the DfE Program and particularly the fabric care project (I find myself no longer using the word "dry cleaning" because I think we've gone beyond that to include other processes) is one of the most exciting things that I've been involved in professionally. We're really making a change in the way people do business. We are now starting to impact the garment industry, and ultimately we'll be impacting the polymer industry. For us, that comes full circle, because OPPT also has the Green Chemistry program which is trying to come up with environmentally benign ways of doing chemical synthesis. All of a sudden, we have this unusual circumstance of us working with chemists like Professor Joe DeSimone at the University of North Carolina on the Green Chemistry side, who runs polymer reactions in environmentally benign solvents such as liquid carbon dioxide. That information has implications for developing chemicals, such as surfactants and finishes, that will be used in the fabric care industry particularly the use of liquid CO₂ as a fabric cleaning solvent. It's a marvelous example of industrial ecology at work.

1

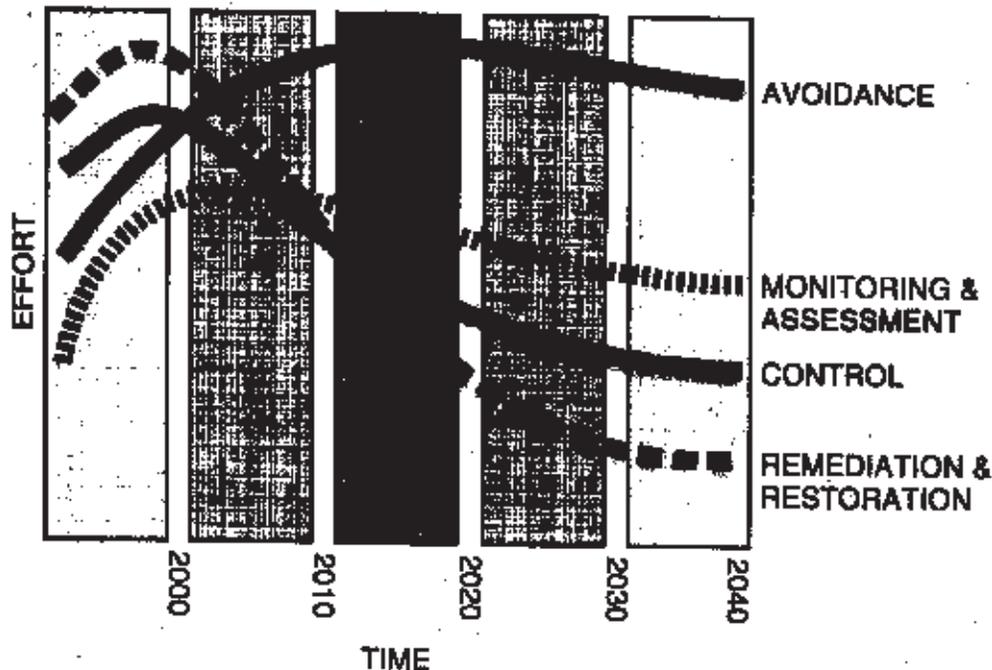


Design for the Environment Partnerships for a Cleaner Future



2

Industrial Ecology: Technology Development



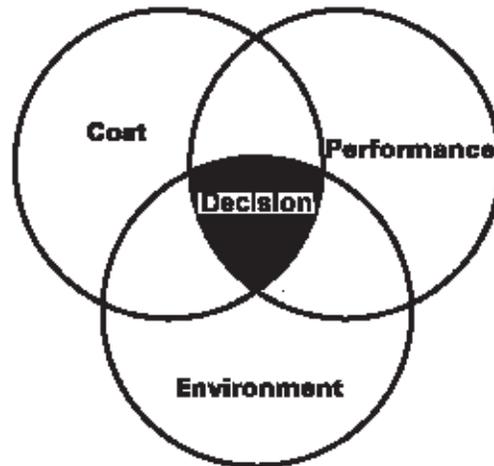
Stephen M. Edgington, "Industrial Ecology. Biotech's Role in Sustainable Development." *Bio/Technology*, Vol. 13, p. 31.

3



DfE Vision:

- ◆ **Business decision-makers integrate environmental concerns into cost and performance criteria**



4



DfE Mission:

- ◆ **Use the Office of Pollution Prevention and Toxics' risk management methodology to inform business decisions**

Information

+

=

Incentives

**Behavior
Change**



5



What Is a Cleaner Technology Substitutes Assessment (CTSA)

- ◆ **A systematic comparison of the**
 - **Performance**
 - **Cost**
 - **Human health and environmental risk**
- associated with chemicals, processes, and technologies**



ELECTRONICS



PRINTING



METAL FINISHING



DRY CLEANING



AIRSPACE

6



Goal of the CTSA:

- ◆ **To evaluate**
 - **Traditional and alternative technologies**
 - **Substitutes**
 - **Control options**
- ◆ **To lay out the trade-offs among the options**
- ◆ **to facilitate informed decisions**



ELECTRONICS



PRINTING



METAL FINISHING



DRY CLEANING



AIRSPACE



CTSA Modules

Basic Chemical Information	Release Estimates	Federal Regulatory Status
Human Health Hazard Summaries	Exposure Estimates	Basic Cost Information
Environmental Hazard Summaries	Risk Assessment	Performance Data
Market Information	Safety & Process Hazard Issues	International Trade Issues
Process Description	Pollution Prevention & Control Options	Social Costs & Benefits



ELECTRONICS



PRINTING



METAL PROCESSING



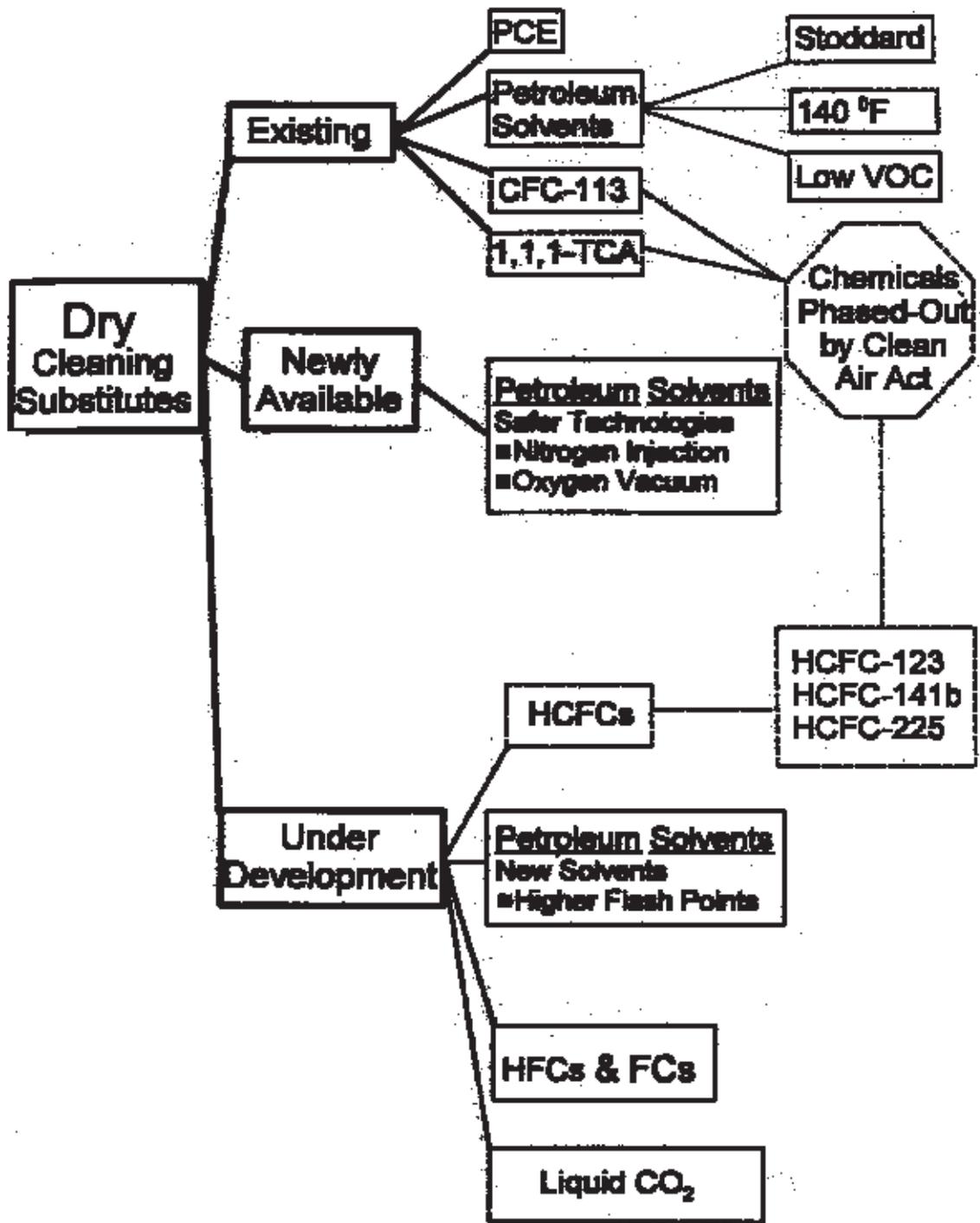
DRY CLEANING



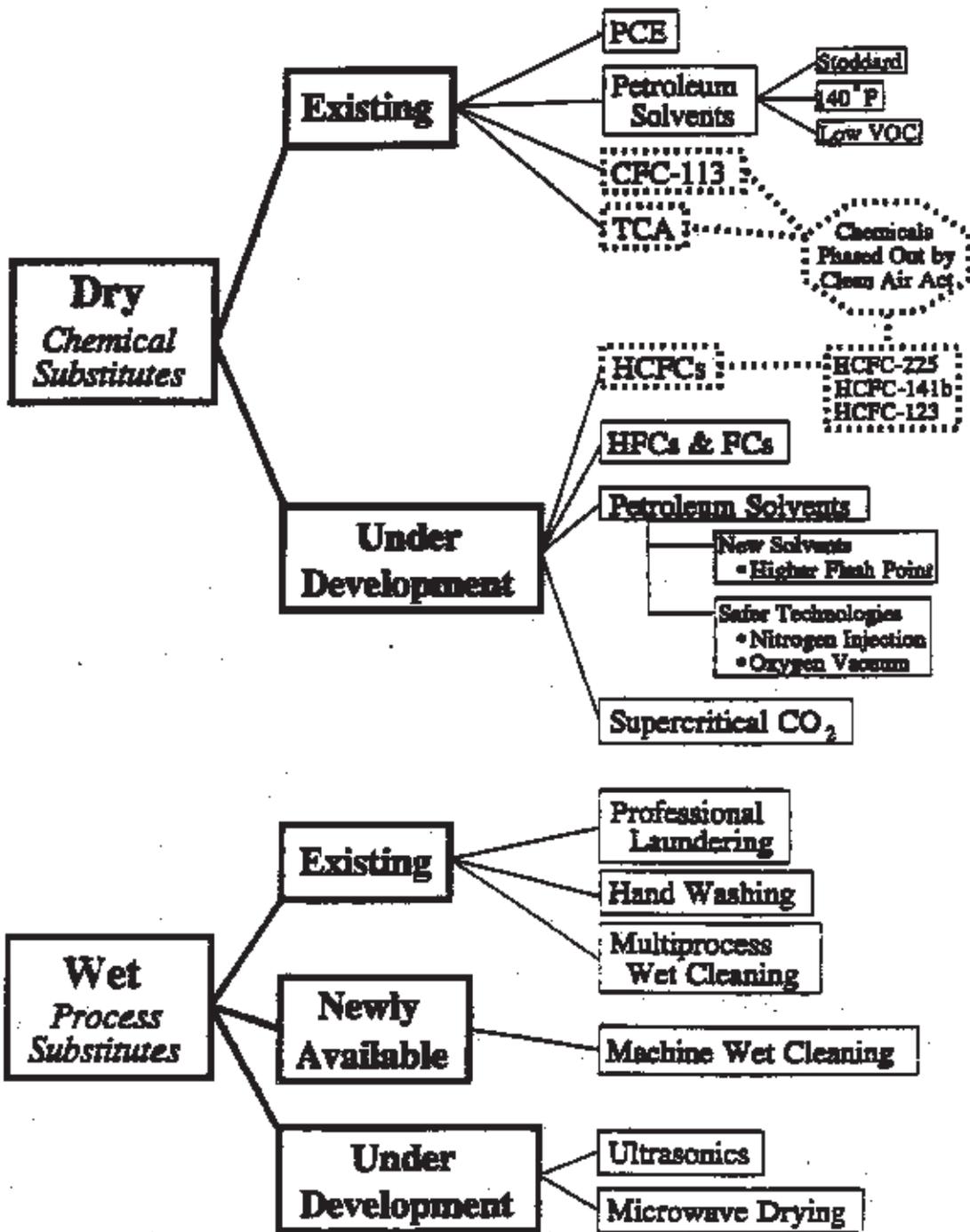
APPAREL

8

EXISTING AND EMERGING DRY CLEANING ALTERNATIVES



Clothes Cleaning Alternatives



10

Alternative Fabricare Technologies Comparison Chart

CHARACTERISTIC	PERC	FE	WET CLEAN	CO ₂	MICROWAVE	ULTRASONIC	NEW PE
Chemical Use							
Solvent Use	gal/yr	gal/yr	N/A	gal/yr	N/A		gal/yr
Solvent Mileage	lit/gal	lit/gal	N/A	lit/gal	N/A		lit/gal
Hazard							
Cancer							
Non-Cancer: Neurotoxicity							
Non-Cancer: Irritant							
Non-Cancer: other							
Environmental							
Flammability							
Human Exposure							
Worker Inhalation							
Worker Dermal							
Adjacent Resident							
Relative Risk							
Cancer							
Non-Cancer							
Environmental							
Costs							
Maintenance Costs	\$	\$	\$	\$	\$	\$	\$
Capital Costs	\$	\$	\$	\$	\$	\$	\$
Annual Operating Costs	\$	\$	\$	\$	\$	\$	\$
Total Annual Costs	\$	\$ range	\$	\$	\$	\$	\$
Consumer Issues							
Clothing Applicability							
Other							
Clothing Performance							

EPA's ORD Research Program on Alternative Textile Care Technologies: Part I

Charles Riggs

Texas Woman's University

Dr. Riggs is a professor at Texas Woman's University (TWU) in the Department of Fashion and Textiles. He has been involved in research, teaching, and professional service to the laundry and dry cleaning industry for more than 20 years. In addition to teaching and research duties at TWU, he serves as Director of the Texas Research Center for Laundry and Dry Cleaning. The Center was founded in 1983 as a cooperative effort between TWU and the Southwest Dry Cleaning Management Institute. Dr. Riggs holds a Ph.D. in Chemistry.

I wanted to give you a little bit of history. The Research Center for Laundry and Dry Cleaning at Texas Woman's University (TWU) was founded in 1983 with the sole purpose of providing a center in Texas for research and training in laundry and dry cleaning. The Texas Laundry and Dry Cleaning Association uses the center as a training facility. The association worked with the manufacturers of professional cleaning equipment to provide the university with the equipment. In 1983, it amounted to about a half million dollars of donated equipment to put the center together. Since that time, there has been some evolution of the equipment and some replacement; we are trying to keep it up to date. This project will probably bring us to the cutting edge of technology at the center. TWU also runs the center as a production plant where we service the uniforms on campus and do over-the-counter work. The project will, indeed, give us access to typical customer items, and we can collect data in that form.

TWU has very active participation with industry, and I wanted to give credit to our partners within the industry who have long supported our research programs at TWU. We have worked with the Southwest Drycleaners Association, the Textile Rental Service Association of America, and the Uniform and Textile Services Association of America. For the project we're speaking about today, we are in partnership with North Carolina State University (NCSU). The two universities jointly responded to a request for proposals for Testing and Development of Pollution Prevention Alternatives to Reduce Indoor Air Emissions from Perchloroethylene Dry Cleaning and Dry Cleaned Fabrics from the U.S. Environmental Protection Agency (EPA) and we were successful in receiving the funding. It was mentioned earlier that I would speak about results, but results are not yet completed. In fact, the project is just beginning, so, rather than talk about results, Dr. Perry Grady and I will talk about our inten-

tions. I think the timing is excellent because this gives us a chance to respond to your concerns and input as to what directions we should follow with the project. NCSU, with its engineering capability, will identify and screen new technology, and, in many cases, build equipment to evaluate how well it will clean and perform. At TWU, with our operating plant, we will be looking at technology currently available to the industry. Then together, we intend to develop a protocol that would be universally acceptable to evaluate cleaning technology. Certainly our intention is to learn from the European research organizations and not try to deviate from what's being done in Europe. In fact, one of our students has just returned from 2 weeks at the Hohenstein Institute, learning the European protocol for wet cleaning assessment, which we will try to adapt as closely as possible in our trial efforts.

Dry Cleaning Technology

Perchloroethylene (perc) is indeed the most commonly used solvent. There's also solvent cleaning with hydrocarbons, and both hand and machine wet cleaning. What we're talking about here today is more machine wet cleaning and the distinction is more of a production technique. At this point companies have already contributed to help support this project with EPA. We have the wet cleaning machine from UNIMAC in place and running and a drying cabinet from Aquatex (a central part of the wet cleaning procedure is to be able to dry without agitation). Boewe-Passat, Permac division is sending two machines, a perc machine and a hydrocarbon dry cleaning machine. We will be using the Exxon synthetic hydrocarbon solvent DF2000. Our assessment is that this solvent would provide the most reproducible results since distilled hydrocarbons vary somewhat in composition from one

manufacturer and one distiller to another. We are still optimistic that we can actually evaluate the carbon dioxide technology. It's not currently available to the industry, but projections are that it will be available in the near future. So, if we have a machine available which is characteristic of what will be sold to the industry, then we will also include that technology in our assessment.

I wanted to review some of the basic concepts so you would appreciate some limitations of the project. In typical solvent cleaning, the process is one of cleaning, filtering, distilling, and reusing the solvent within the cleaning plant. So, this industry is indeed one that is a recycling industry and always has been. Solvents are most effective on oily type soils. In fact, very little additive is necessary to remove oily soils from fabrics, but it's quite difficult to remove water-soluble soils such as perspiration, salt, and sugar. Some fibers are sensitive to solvents, and some dyes and finishes are removed by solvents. As has already been stated, perchloroethylene has the advantage of not being flammable, but it has health and environmental concerns; whereas, hydrocarbons are flammable, and they may also pose some long-term health and environmental concerns. For wet cleaning, we want to distinguish that this is not laundering; this is not a technique that would be practiced at home. It would require the care and training of a professional. In the case of wet cleaning, the water is discharged to the sewer so there may be some environmental consequences to consider. Wet cleaning is most effective on water-soluble soils, and the problem soils are oil-based and would require additives to remove. Again, we have a fiber compatibility problem. We may see some shrinkage with fibers such as wool and rayon, and some dyes are water soluble. In the past, the garment manufacturers have selected care labels for laundering instructions or dry cleaning instructions based upon those compatibility problems with fibers and dyes. As we began to look at using wet cleaning as an alternative to dry cleaning, we find compatibility problems that require careful attention. Our objective, in part, is to evaluate the cleaning technology. We looked at this from a consumer's perspective in terms of what does the consumer expect from taking something in to have it cleaned. Getting the garment back clean without damage is a prime consideration. And, indeed, our protocol would be to look at the ability to clean as well as the consequences to different kinds of fabric.

Performance Criteria

For each technology, we want to identify problem soils. We already know part of our results for wet

cleaning—problem soils are those containing an oily component. For solvent cleaning, it would be those containing a water-soluble component. We also want to identify for each technology what fabrics create problems. We have some indications in terms of what can be possible for care labels. We also, at some point, (and this is not currently funded under the project) need to evaluate variables brought about from the manufacturers in terms of how the garments are constructed. We've already found some anecdotal cases in terms of how fabrics that are fused respond differently to the different cleaning technologies.

To evaluate cleaning performance, our plan is to look at some of the standard cleaning assessments swatches available from the International Fabricare Institute and European laboratories. The objective is to adequately represent what a consumer might expect in terms of soil removal from a garment. We also are going to be selecting fabrics to evaluate. The ones that we feel are fairly obvious to look at are those that would be difficult to launder, or those that would normally be sold at this time with a "dry clean only" label: wools, silks, rayons, and some acetates. The project is not designed to look at the whole laundering issue in terms of evaluating launderable fibers like cotton and polyester, but to look at the fibers that would be difficult if we had to suddenly eliminate solvent cleaning. The objective for each of these technologies is to identify problem areas and limitations, specifically with regard to what soils they can handle and what fabrics can be safely processed. This research would provide the American Association of Textile Chemists and Colorists and the American Society for Testing and Materials with information that would have an impact on revisions of care labels, so that the care label coming to a cleaner would give them proper instructions as to what they can and cannot do with a garment. One of the keys is to provide a technology or a protocol by which we could look at cleaning technologies and make a comparison of how the technologies perform in terms of soil limitations and fabric limitations. Being optimistic, what kind of objectives might we then follow up with when this project is finished? The objective would be certainly to continue this kind of dialogue with this kind of group and continue to establish better communications between the cleaning industries and the apparel manufacturers. We wish also to acknowledge that we plan to learn from our colleagues in Europe. I see no reason for us to spend money to evaluate technology that they've already looked at, so we're looking forward to an ongoing dialogue with European and other international organizations in terms of this technology.

1

Texas Research Center History

- Established in 1983 to provide a facility for research and training in laundering and drycleaning
- Donation of equipment by manufacturers coordinated by the Texas Laundry and Drycleaning Association (TLDA)

2

Texas Research Center Industry Partners

- SDA (Southwest Drycleaning Association) previously TLDA (Texas Laundry and Drycleaning Association)
- TRSA (Textile Rental Services Association of America)
- UTSA (Uniform and Textile Services Association of America)

3

Texas Research Center Related Programs

- Drycleaning and laundering courses—sponsored by SDA
- Production Management Institute—cosponsored by TRSA and UTSA
- Maintenance Management Institute—cosponsored by UTSA and TRSA
- Research—sponsored by Texas Food and Fibers Commission (TFFC) and EPA

4

Testing and Development of Pollution Prevention Alternatives to Reduce Indoor Air Emissions from Perchloroethylene Dry Cleaning and Dry Cleaned Fabrics

5

**North Carolina State University
College of Textiles**

&

**Texas Woman's University
Texas Research Center for
Laundry and Drycleaning**

6

- NCSU—Identify and Screen New Technology
- TWU—Evaluate Currently Available Technology
- Both—Develop Universally Accepted Procedures to Evaluate Cleaning Technology

7

Current Cleaning Technology

- Solvent Cleaning Using Perchloroethylene is Most Common Method
- Solvent Cleaning Using Hydrocarbons
- Wet Cleaning—Machine and Manual

8

Plant Scale Equipment

Texas Research for Laundry and Drycleaning

Project Contributors:

UniMac Company— Wet Cleaning Machine, Model UA230,
with Seitz Chemicals

ADC Dryer Model UD80 with Microcomputer

\$10,000 for supplies

AquaTex— Drying Cabinet

Böwe Passat— P546 46 lb, Perchloroethylene Drycleaning Machine

Exxon— DF2000 Hydrocarbon Solvent

Pending— Liquid Carbon Dioxide Cleaning Machine

9

Solvent Cleaning

- Solvents are filtered, distilled, reused at the cleaning plant
- Most effective on oily type soils—require additives to remove water soluble soils
- Some fibers are sensitive to solvents
- Some dyes and finishes are removed by solvents

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Solvent Cleaning

- Perchloroethylene—nonflammable—health and environmental concerns
- Hydrocarbons—flammable—may be health and environmental concerns

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Wet Cleaning

- Not laundering
- Water discharged to sewer
- Most effective on water soluble soils—additives required to remove oily type soils
- May cause shrinkage of wool, rayon
- Some dyes are water soluble

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Evaluating Cleaning Technology

- Ability to Clean
- Minimum Damage to Garment

13

Performance Criteria

- Soil Removal—Identify Problem Soils
- Fabric Damage—Identify Problem Fabrics
- Variables in Garment Construction

14

Soil Removal Standards

- IFI Cleaning Performance Test
- Krefeld Standard Soils
- TNO Standard Soil
- Others

15

Fabric Selection

- Wool—Lightweight, Worsted, Woven
- Wool—Heavyweight, Woolen, Woven
- Wool—Medium Weight, Woolen, Knit
- Silk—Lightweight, Woven
- Rayon—Lightweight, Woven
- Acetate—Lightweight, Woven

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Final Report

- Identify problem areas and limitations of each technology
- Provide input through AATCC and ASTM to update care labels
- To provide a universally accepted method of evaluating cleaning technologies

Future Objectives

- Establish better communications between cleaning industries and apparel manufacturers
- Form cooperative linkages with international cleaning associations

EPA's ORD Research Program on Alternative Technologies, Part II

Perry Grady

North Carolina State University

Dr. Grady is the Associate Dean of Textiles and Professor of Textile Engineering, Chemistry, and Science at North Carolina State University. He has taught and conducted extensive research in textiles, instrument and control system design and development, computer applications, energy utilization and conservation, and fiber production and properties. Dr. Grady received a Ph.D. in Fiber and Polymer Science, as well as his M.S. and B.S. in Electrical Engineering, from North Carolina State University.

At North Carolina State University, we are principally working on the development of new and existing technologies that may prove to be viable alternatives to the use of perchloroethylene (perc) and other presently available systems. One of the things we're currently working on is ultra-sound cleaning. As most of you know, cleaning variables involve time, temperature, agitation, and chemistry. Ultra-sound may prove to be a substitute for mechanical agitation, water, perc, and hydrocarbon cleaning. It also may substitute, partially at least, for temperature. That is, we may be able to clean at a much lower temperature than we would without ultra-sound. We are looking at ultra-sound both for solvent-based and water-based systems. The ultra-sound for solvent-based cleaning will use perc and DF2000 systems as benchmarks. Just by looking at their properties from the literature and so forth, we have actually screened about 135 different solvents. I think we've used 11 or 12 to actually do some preliminary tests. We have done this as very rough testing. Later, we will use the successful preliminary experiments to do standard tests on fabrics and soils.

Preliminary results for ultra-sound solvent-based cleaning indicate that solvents that work on a soil in normal type drycleaning will work on the same soil much faster with the use of ultra-sound. And the opposite is also true—solvents that don't work on a soil are not going to be effective with ultra-sound. So, in essence, ultra-sound will enhance whatever a solvent's ability has to take off a soil to begin with. In using ultra-sound cleaning on a water-based system, our objective is to develop a greener cleaning system that removes complex soils and eliminates the use of non-aqueous solvents. This may prevent shrinkage in such fabrics as wool because it eliminates most of the

usual mechanical agitation that is one of the primary causes of shrinkage, rather than the water. So ultra-sound may give us a way to apply water-based cleaning without all of the agitation. We're finding that a temperature of 122° Fahrenheit gives good results. We get some very good cleaning from this. We have found that using ultra-sound and wet cleaning may give you hand problems, but that's probably due to the fact that we're not tumble drying the garments. We would probably need to find a way to dry them that would enhance the hand by giving some kind of substitute for agitation. As we find systems that work in both the water-based and solvent-based tests, we will use the standard samples and soils so that we will be able to compare all these types of cleaning. In the initial work, which has been going on for some time in ultra-sound, however, we have done very crude screening-type research because it would be too expensive to run all of the standard type soils and samples with this type of experimental apparatus.

In carbon dioxide (CO₂) cleaning, we will focus our research on liquid or subcritical technologies. Originally, we had thought in terms of supercritical carbon dioxide cleaning, but it turns out that supercritical CO₂ may damage buttons and zippers, while subcritical CO₂ seems to work well. When Charles Riggs [EPA's ORD Research Program on Alternative Textile Care Technologies, Part I] was talking about the supercritical or the liquid CO₂ work that they were doing, he was referring to a prototype commercial machine. We are in the process of building a benchtop experimental apparatus so we can get a very wide range of variables and look at the use of surfactants and examine the variables in liquid carbon dioxide cleaning. This will allow us to look at many more things than we could in a pro-

totype system and should tie in very well. Again, for the things we find successful in carbon dioxide cleaning, we will then run those experiments on standard samples, and so forth.

At North Carolina State University, we're using our testing lab to run most of the tests on the samples that Charles Riggs produces as well as those that we produce, so that we can compare them all in one place. As much as possible, we're trying to use American Society for Testing and Materials American Association of Textile Chemists and Colorists type standards so that we will be able to compare with the work that other people do and not have to generate or produce entirely new test methods, although some of that may be necessary.

I have a lot more details on what we're planning to do and even some of the preliminary results. I'll be

happy to discuss those now or in the discussion session. I want to reemphasize what Charles Riggs has said, that this project is just getting underway. Most of the work will be done in the coming months. It was proposed and accepted as a 3-year project, but we've only been funded for 1 year. Our results obviously will depend on whether we're able to secure second and third year funding for this work. What we've laid out is primarily for 3 years, but we've tried to adjust the project so that if funding does not come forward for the second and third year we will still produce some useful results even in the first year. We have formed an advisory committee for this project and the first meeting will be Wednesday, September 12, 1996, in Raleigh. We think this is an excellent forum and we would welcome any input you have into the design and direction of this project.

1

Testing And Development of Pollution Prevention Alternatives to Reduce Indoor Air Emissions from Perchloroethylene Dry Cleaning and Dry Cleaned Fabrics

**By Perry L. Grady
College of Textiles
North Carolina State University**

2

Ultrasound Cleaning

- **Cleaning Involves**
 - Time
 - Temperature
 - Agitation
 - Chemistry
- **US May Substitute for**
 - Mechanical Agitation in Water PCE & Hydrocarbon Cleaning
 - Temperature

3

Ultrasound Cleaning

- **Solvent Based**
 - **Benchmarks**
 - PCE
 - DF-2000
 - **135 Screened, 11 Used**
- **Preliminary Results**
 - **Solvents That Work on a Soil Will Work Faster With US**
 - **Solvents That Don't Work on a Soil Are Not Effective With US**

4

Ultrasound Cleaning

- **Water Based**
 - **Objective:**
 - **Develop a "Greener" Cleaning System That removes Complex Soils and Eliminates Use of Non-Aqueous Solvents**
 - **May Not Cause Shrinkage**
 - **Eliminates Most Mechanical Agitation**
- **Preliminary Results**
 - **122 Degrees F Gives Reasonable Results**
- **Standard Samples & Soils Will Be Tested**

Carbon Dioxide Cleaning

- **Focus on Liquid (Subcritical)**
 - **Supercritical May Damage Buttons and Zippers**
- **Bench Top Experimental Apparatus**
- **Wide Range of Variables**



Apparel Care and
the Environment
Alternative Technologies and Labeling

Summary of Discussion

Session I



Ohad Jehassi of the U.S. Environmental Protection Agency (EPA) opened the floor to questions.

Jack Weinberg of Greenpeace remarked that the Design for the Environment (DfE) Dry Cleaning Project has been a great success so far. He stated that the project had been very successful and should be highly lauded. On the other hand, it's far, far from complete. Mr. Weinberg closed by asking what the future holds for DfE and for the Dry Cleaning Project.

Dr. William H. Sanders of EPA responded by stating that what is happening with the program is the same as what's happening with lots of programs that are funded by the Environmental Technology Initiative out of Congress. What happened this fiscal year is that the money the agency received was reduced. The scope of work the Agency is allowed to do has also been reduced. The hope is that next fiscal year the money will be back up to where it has been in previous years. This year the DfE program didn't get full funding. Money out of the Office of Pollution Prevention and Toxics (OPPT) was used to help keep the DfE program going, because they recognize the value of the program.

Mr. Weinberg asked if it was reasonable to assume that the level of activity might not be the same, but that the Dry Cleaning Project would be going on for some time into the future.

Dr. Sanders replied that it is a priority at OPPT to make sure that it does continue on.

Manfred Wentz of the Fabricare Legislative and Regulatory Education Organization voiced his support for the DfE program. It is absolutely essential for the dry cleaning industry to be supported by somebody because the industry itself does not have sufficient funds to attack and resolve some of the larger issues. Dr. Wentz expressed his pleasure that the apparel care industry is making progress towards solving problems.

Ed Wituschek of Environment Canada asked if anyone had information on a human health risk assessment for petroleum solvents. If perchloroethylene (perc) is regulated in Canada petroleum solvents may increase.

Dr. Joseph Breen of EPA noted that the Cleaner Technologies Substitutes Assessment (CTSA) was moving forward.

Kaspar Hasenclever, Kreussler, Wiesbaden, Germany, provided a response to Mr. Wituschek's question. In metal cleaning and dry cleaning, hydrocarbon solvents are used in processes that have recycling, so that these solvents will not directly affect the workers. It was judged that the risks coming from hydrocarbon solvents in dry cleaning was low enough that you could negate them.



Apparel Care and the Environment

Alternative Technologies and Labeling



Summary of Discussion

Session I (Continued)

Bill Seitz of the National Cleaners Association - International (NCA-I) corrected a statement made by Mr. Jehassi stating there were currently about 100 shops doing wet cleaning in the United States. There are approximately 36,000 dry cleaners in the United States. Probably 95 percent of those dry cleaners do a percentage of wet cleaning as part of their daily functions, because there are garments that require wet cleaning in addition to or instead of dry cleaning. Perhaps what Mr. Jehassi meant to say was that there are doing wet cleaning exclusively.

Mr. Jehassi clarified that he was referring to machine wet cleaning.

Mr. Seitz responded that there are different kinds of wet cleaning machines. Domestic washing machines are machines. Wet cleaning is not new to the dry cleaning industry.

Paula Smith from the Indiana Department of Environmental Management questioned Mr. Jehassi about the Small Business Administration (SBA) workshops being held concerning dry cleaning. She asked if the states were involved with these workshops.

Mr. Jehassi said that a number of the state programs have worked with the SBA small business development centers. Currently, EPA is simply designing the program, and have not yet decided what states will host the workshops. It depends on our funding.

Kay Villa of the American Textile Manufacturers Institute (ATMI) asked Dr. Breen to clarify an earlier comment. Near the end of your presentation he made a comment about finding environmentally-friendly cleaning systems. Alternative cleaning methods may require different techniques to produce textiles and these techniques may not be the most environmentally friendly way.

Dr. Breen responded that the point he was making was that rather than thinking of dry cleaning as an isolated piece of a process, it really should be thought of as part of an industrial ecological web. Those pieces of the puzzle are starting to come together and that sometimes when you look at those interconnections, the whole is greater than the sum of the parts in terms of the gains you can make.

Ms. Villa stressed that even though the textile industry may come out with fabric that can be cleaned using alternative processes that does not necessarily mean what we have done upstream in terms of the manufacturing of the fiber will necessarily be environmentally friendly.

Dr. Breen responded that Ms. Villa was correct and that those parts of the process need to be factored in to discussions about the environmental impact of apparel care.

Jodie Siegel of the University of Massachusetts - Lowell added that it is really important to look at everything in the entire life cycle of the textile and not just the cleaning because otherwise problems are created upstream.



Apparel Care and the Environment

Alternative Technologies and Labeling



Summary of Discussion

Session I (Continued)

Jack Belusci of Global Technologies asked Mr. Jehassi what type of financial incentives were in place to help small cleaning establishments jump to the new technology. Global technology is working on carbon dioxide. Dry cleaners are very concerned about the financial bottom line and even though there are initiatives for new technology there doesn't seem to be a foundation either on the state or federal level for the tax incentives for additional labor that may be coming from wet cleaning or additional capital investments.

Mr. Jehassi said he was not aware of any federal programs that provide funding to help cleaners move over to safer technology. The state of California does have a program in place. It would be a good idea to engage the Small Business Administration to try to create that type of program.

Doug Kelly of Boewe-Permac added that the state of Minnesota is offering 3 or 4 percent loans for environmentally friendly projects for new business.

Ms. Smith said that Indiana has a \$200,000 available in challenge grants for states. Dry cleaners are included in that. Two applications came in this year for wet cleaning. One is the converting of the transfer machine to a wet cleaning machine. Funds are not available for equipment but funding for the education to run it and the training needed is available.

Eric Frumin of UNITE commented that it's good to know that in some places around the country the industry is looked at in realistic terms with regard to its ability to handle this transition but that in some places the sympathy just isn't there. Right now the industry is getting very little help. It really isn't getting any attention in most places where it really needs it.

Mr. Weinberg agreed that financial support for the transition to wet cleaning was a vital topic. He urged EPA to help facilitate some stakeholder process and hoped the wet cleaning partnership would be willing to participate as well. EPA should work with states or other agencies that have financial support programs and help them configure those programs so they can be of specific assistance to this industry.

Dr. Riggs expressed his support for what Ms. Villa and Ms. Siegel said with regard to the need to look at the upstream aspects, but believes the aspect of final disposal should also be looked at. Once clothing has served its useful life span in the hands of the consumer, how difficult is it to dispose of at that point. Looking at the chemistry from a very simplistic view, the more resistant the fibers and dyes are to damage from these various cleaning processes the more difficult they are going to be to dispose of at the end of the garments life.

Eric Frumin commented that within the European Community the green labeling issue provokes some discussion about the environmental hazards from fibers all the way through to disposal that incorporated some attention to working conditions in the different sectors of the industry.



Apparel Care and the Environment

Alternative Technologies and Labeling



Summary of Discussion

Session I (Continued)

Dr. Kruessman built on Mr. Frumin's comment saying that eco labeling for textiles, at least in Europe is at a point where some important issues have been discussed. A lot of these issues, especially in terms of the life cycle of a textile, are very difficult to resolve.

Ms. Villa of ATMI was involved in developing a U.S. position policy statement on these eco standards. It's more of a trade issue than a true technical issue. These methods were developed without any testing to validate them. Don't look at them for any specific details to really clearly differentiate what is going on here.

Mr. Frumin clarified his comment, saying that Europeans have a very different perspective on what they would claim as a life cycle analysis. There are a lot of other technical difficulties in the way they describe what happens to the effluent downstream. They have a totally different method of water treatment, so it's really trying to compare apples and oranges.

Ms. Siegel attempted to sum up the comments, saying Eric is talking about the European care label and not the eco label. The Europeans are further ahead of us on developing care labeling for wet cleaning.

David Porter of Garment Care, Inc. commented that his main competitors are customers that clean their own clothes. He urged participants to keep in mind the economic ramifications of whatever environmental technologies come to the forefront.

Jenni Cho of the Korean Youth and Community Center in Los Angeles asked if EPA could possibly work with either Korean community groups or the Korean Dry Cleaning Associations.

Mr. Jehassi responded that EPA does work with the Korean Dry Cleaners Associations and would welcome any participation of any additional organizations.

Mr. Weinberg commented that the CTSA was supposed to be out in 1994. Since then, in terms of the technical issues addressed in Phase I, there has been little new research or development. The delay, on the part of the EPA, in publishing it has contributed to conflict between partners. Clearly there has been an area of on-going contention about just how toxic is perc? Is it not toxic? Is it a threat? Is it a risk? How do you characterize the risk? That's always been a division. There is a general agreement that there is an environmental and health concern but beyond that, the characterization has always been a matter of some disagreement. The inability, up to now, of the EPA to speak on this question has contributed to tension between participants that can be avoided once we get that behind us.

Dr. Breen responded saying the decision had been made to do an integrated Phase I and Phase II. Both should be out in 1997. There is a formal peer review process that the agency goes through where a particular panel of individuals are identified to serve as peer reviewers. The input for names of



Apparel Care and the Environment

Alternative Technologies and Labeling



Summary of Discussion

Session I (Continued)

people to serve on the panel are solicited by individuals who may well serve as stakeholders. The process where the materials are shared with all of the stakeholders, will not happen until after the peer review process is completed. The current plan is to complete phase I and phase II together. Phase II is almost completed, and both phases are pretty close to being ready to go.

Mr. Jehassi formally ended discussion.



Apparel Care and
the Environment
Alternative Technologies and Labeling



Session II

Textile Care Research Programs in Germany

Josef Kurz

Hohenstein Institute, Boenningheim, Germany

Mr. Kurz is Business Manager of the Textile Care Research Division, and Manager of Laundry and Textile Hygiene for Hohenstein, a research institute in Germany. Under Mr. Kurz's leadership, Hohenstein established itself as the leading European textile care research institute where alternative cleaning technologies are systematically developed, studied, and evaluated. Mr. Kurz earned a Professional Engineering degree in Textile Chemistry from The Technical Academy in Hohenstein, Germany.

I have prepared my presentation with four parts: marketing data, environmental regulations, the present situation in Germany, and current and new research programs.

Marketing Data

The domestic care of apparel in Germany is about 90 percent home laundered and only 10 percent dry cleaned, wet cleaned, or washed via professional textile care. That means about 200 million articles are cleaned every year in the dry cleaning industry, or an average of 2.5 articles per capita. We also have about 2-3 kilograms of textiles per capita per year. In terms of the composition of the care properties, about 30 percent are washable and can be dry cleaned, and about 70 percent are dry clean only.

In the development of the net sales of the German dry cleaning industry, there was a decline from 1990 to 1995. I think in the United States it's similar to the German situation. In Germany, expenditure per capita for dry cleaning services is about \$13. We must ask what is the reason for this decline. The first question to ask is what has happened to the average disposable income people in Germany have to spend on things such as dry cleaning services. There has been a decline in average disposable income since 1992, so people have less money for dry cleaning services.

Another question is how have clothing habits changed (if at all) in the past few years. Slide 6 shows the development of clothing habits and the percentage or average values for formal clothing and casual clothing. From 1986 to 1996 there was a strong decline in the purchase of formal clothing and an increase in the purchase of casual clothing. Casual clothing is more washable and involves more domestic care. To summarize

this market data, there are three important possible reasons for decline in per capita expenditure for dry cleaning services: (1) decline in disposable income per capita caused by a declining economy, (2) change in clothing habits, and (3) change in the development of apparel construction.

Environmental Regulations

It is important to look at these regulations because the industry has had to invest money, and will have to invest money in the next few years to protect the environment. The two most important regulations are the Clean Air Act (similar to the Clean Air Act in the United States and Canada) and the Water Resources Acts (also similar). Slide 11 shows the dry cleaning industry and dry cleaning plants, different parts of which are regulated by different acts. The Clean Air Act regulates the machine, condensation in the machine, and the still. One difference between German and U.S. regulations, is that in Germany we have to put diffusion barriers at the wall and at the ceilings to protect the adjacent rooms from the impact of solvents such as perchloroethylene (perc). All other aspects are similar to the regulations in the United States. The Water Resources Act regulates the handling of the waste, the contact water treatment, and the figures for the drains.

The Present Situation in Germany

The following types of solvents are used: water (for washing and wet cleaning), organic solvents, perc, and petroleum solvents. In Germany as well as in the

United States, we are also doing research on carbon dioxide. With regard to wet cleaning, we have a special problem in Germany. About 30 percent of the apparel which comes to the dry cleaner every year is washable. The washability is expressed by a care labeling symbol and the dry cleaner sees that the garment can be washed. For 70 percent of the apparel there is no label that indicates that the garment can be washed, and therefore, 70 percent is dry cleaned. In reality, within this 70 percent of articles which are dry cleaned are a lot of articles which could be wet cleaned but not washed. But the dry cleaners do not know which articles can be wet cleaned. If the cleaner wet cleaned such an article and damage occurred, the dry cleaner would have to take responsibility for these damages and pay for them. If the care label indicated that these pieces could be wet cleaned, then about 20 percent of apparel could be wet cleaned by the dry cleaning industry. That means that indication of wet cleanability is essential for progress in wet cleaning all over the world. We would then only have 50 percent of apparel that would have to be dry cleaned. Perhaps we can reduce this amount by new constructions in the textile apparels.

Current and New Research Programs

When I prepared my presentation for today last week in Germany, I collected all the programs, all the research objectives we had in Germany from our colleagues in Krefeld, in industry, at Kreussler, at Hohenstein, and other places. I had a list of programs with very awfully long titles. Instead of telling you all these titles, I tried to make three groups of programs. I thought it would be a good idea to take the color of these solvents to indicate the groups. But unfortunately, all solvents are colorless. So, I looked for another color. I decided the solvents have psychological colors and not real colors. I developed the following colors and I hope you will all agree with me. The first is a Green Program that means water. And the second will be Red for perc. So with perc as a Red program, and petroleum solvents as a Yellow Program, the mixture is an Orange Program. The Blue Program is liquid or supercritical carbon dioxide.

The Green Program

The Green Program studies the applicability of water-based cleaning procedures. Despite the care labeling problem, we have two directions in which to do research work. The first one is properties of the clothing in harmony with care properties; this is a task for the apparel industry. The other one is the treatment

of clothing in dry cleaning plants—the improvement of wet cleaning technology. In regards to the harmonization of care properties, in cooperation with the apparel industry, we have to select the fabrics with regard to colorfastness, shrinkage, and surface properties. We also have to select linings, interlinings, threads, and accessories, and we have to modify design and perhaps workmanship by manufacturing the textiles for the consumer. As an example of our current research work under the Green Program, slide 19 shows two samples before and after each garment was wet cleaned seven or eight times. There was a shrinkage of the shape of the woolen garment. However, if there was an antifelting finish on this material, then the shrinkage could be avoided, or it would have been only 1 or 2 percent. Slide 20 shows a picture under the microscope of the difference between wool with and without antifelting finish. You can see the scales very sharply defined on the wool fiber and you can see a very thin layer of resin on the surface of the wool that helps it to endure the mechanical friction during the wet cleaning procedure and helps avoid the shrinkage and the felting of wool.

Another example that is very important for the development of wet cleaning is a problem with the shrinkage of rayon. If rayon has a resin finish on it, the shrinkage is very small. In regard to the clothing in dry cleaning plants, the reduction of impact on textiles and the optimization of soil removal are very important to the dry cleaner. Adequate finish processes for wet cleaned garments are also very important for the practical work in dry cleaning installations. I have one example that indicates the necessity for international cooperation. Slide 23 shows results from a round robin trial in Europe. The trial was for professional wet cleaning. It was a process for sensitive garments and they used different types of machines with different kinds of mechanical action but the same program. In one of the machines the shrinkage was 1 percent, in another it was 2 percent and both machines were operated according to the sensitive garments process. That means we have to standardize the procedures in the machines and the test methods.

The Orange Program

Perc

The hope here is to reduce the emissions in the atmosphere and ground water. The sources for emissions into air are the dry cleaning machine and the still and these are regulated by the Clean Air Act. The Water Resources Act regulates waste water and contact water management. The current research strives to develop cost effective devices to measure the concentration of perc within the dry cleaning machine. This

process must be better controlled and the final goal is a self-controlling machine. If there are any leaks in the machine, devices must tell the dry cleaner to repair the machines. The aim is to produce very cheap devices to indicate such leaks. The second objective of research is the reduction of residual perc in cleaned garments. I will give you an example of this problem. Retention of adhesives in fusible interlinings is different. Polyester and polyamide interlinings were tested for retention of perc. Slide 21 shows that two of these linings, #2 and #5 have the highest retention rate, about three or four times higher than one of the other samples. We recommend that the apparel industry not use #2 and #5. We recommend the use of interlinings that are not able to retain the perc. So, there is a tight connection between the apparel industry and the dry cleaning research facilities.

Petroleum Solvents

We have three important research directions: control of the safety aspects under practical conditions in the dry cleaning industry, minimization of the fire hazards of petroleum solvents, improvement of the energy balance by combination of distillation with absorption systems. One of these programs could be very interesting to the dry cleaners here in the room. We have a test panel of 210 machines in 180 plants. The solvents used are isoparaffins in different modifications, and the test parameters are flash point, boiling range, flash point decreasing and halogenated solvents, fatty acids, nonvolatile residue, and color.

The Blue Program

For carbon dioxide, we have a similar test program as you have in the United States and I think it would be good to have tight cooperation in the work. The approach, at the moment, in Germany is relatively wide and we are trying to find more applications for carbon dioxide than only the dry cleaning industry. It is important to study the fundamental impacts on textiles on the practical condition and the scientific research programs and then develop cost effective cleaning systems consisting of a drum, filtration unit, recovering units, and measurement devices. I know that you have in your country a machine which is new to the practice. One of the most important research goals is the improvement of cleaning efficiency. We are studying whether to use liquid carbon dioxide since all the organic solvents use a small amount of water to remove the water soluble soils. Perchloroethylene, hydrocarbon, and especially carbon dioxide in liquid form only can dissolve oil and fatty dirt from the garment but not salt and other polar substances. So we have to add 1 or 2 percent of water in order to dissolve these water soluble parts.

Perhaps, it's a long way to the Blue Program or a short way. Many people do not believe that it is possible to clean garments in carbon dioxide. For those people who ask if it is possible, I'll leave you with a quote from Geraldine Ferraro, "It was not so long ago that people thought semiconductors were part-time orchestra leaders and microchips were very, very small snack foods."

1

TEXTILE CARE RESEARCH

PROGRAMS IN GERMANY



Josef Kurz

**Hohenstein Institute, Schloss Hohenstein
D-74357 Boennigheim**

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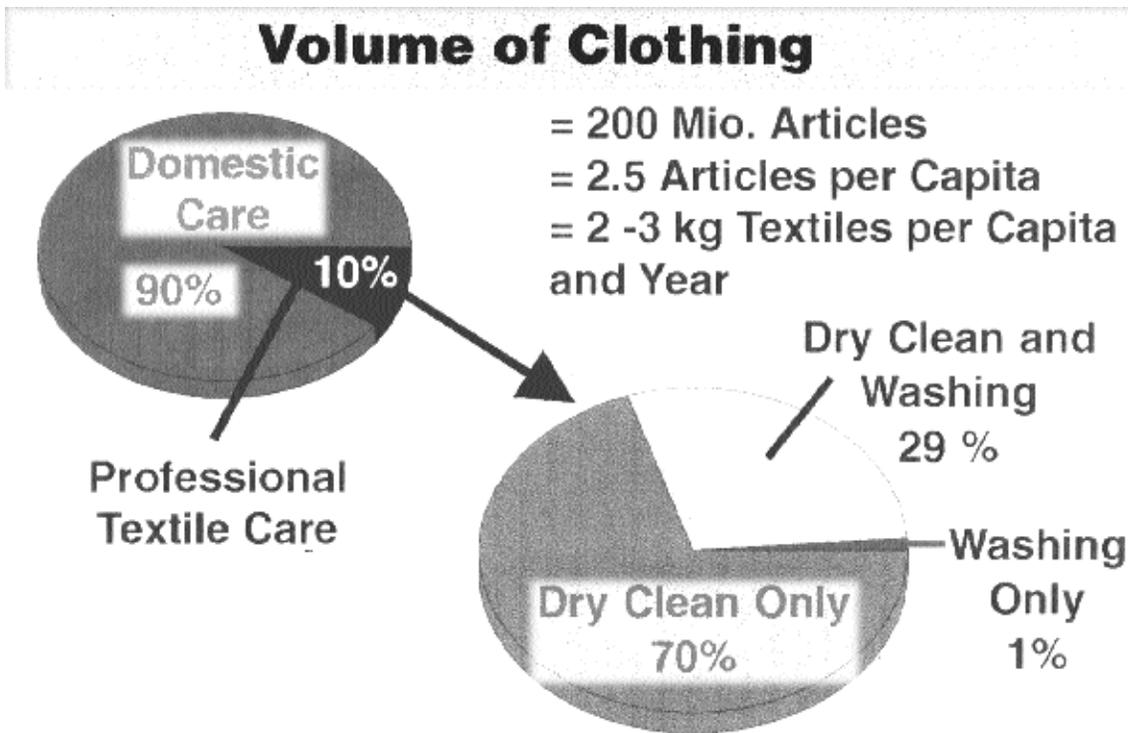
A Market Data

B Environmental Regulations

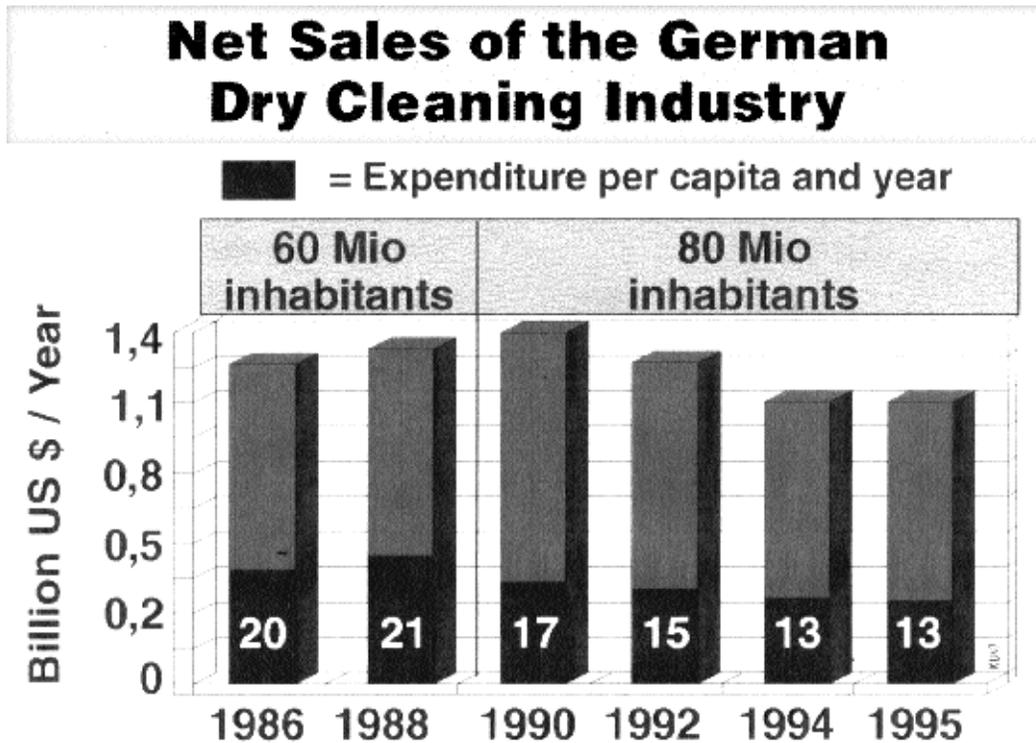
C Present Situation

D Current and New Research Programs

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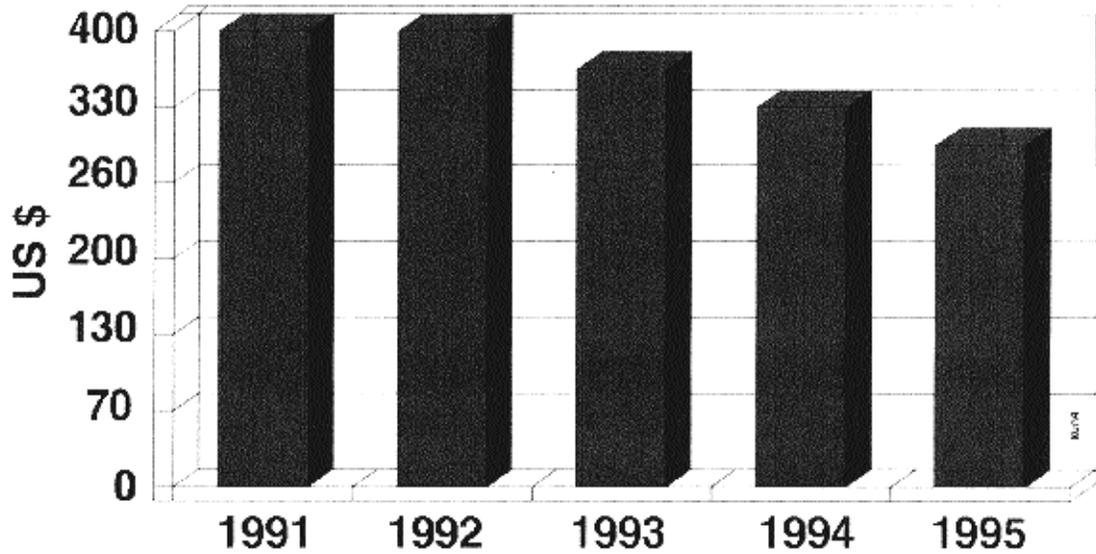


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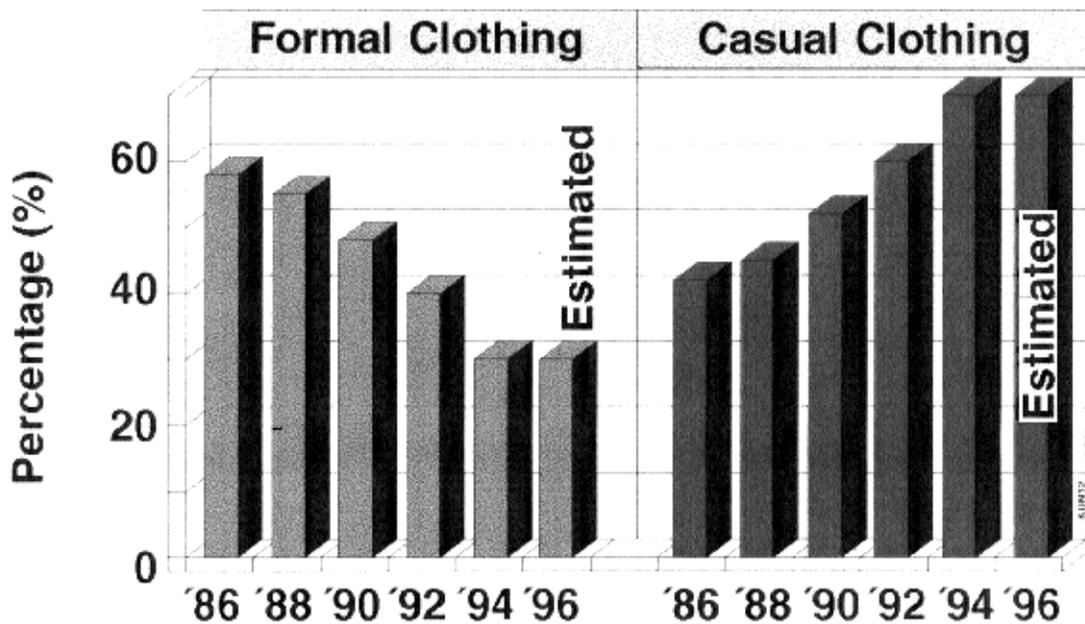
5

Average Disposable Income (per Capita)



6

Development of Clothing Habits



7

Possible Reasons for Decline in Expenditure per Capita for Dry Cleaning Services

- ▶ **Decline in disposable per capita income (caused by declining economy)**
- ▶ **Change in clothing habits**
- ▶ **Development of apparel**

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A Market Data

B Environmental Regulations

C Present Situation

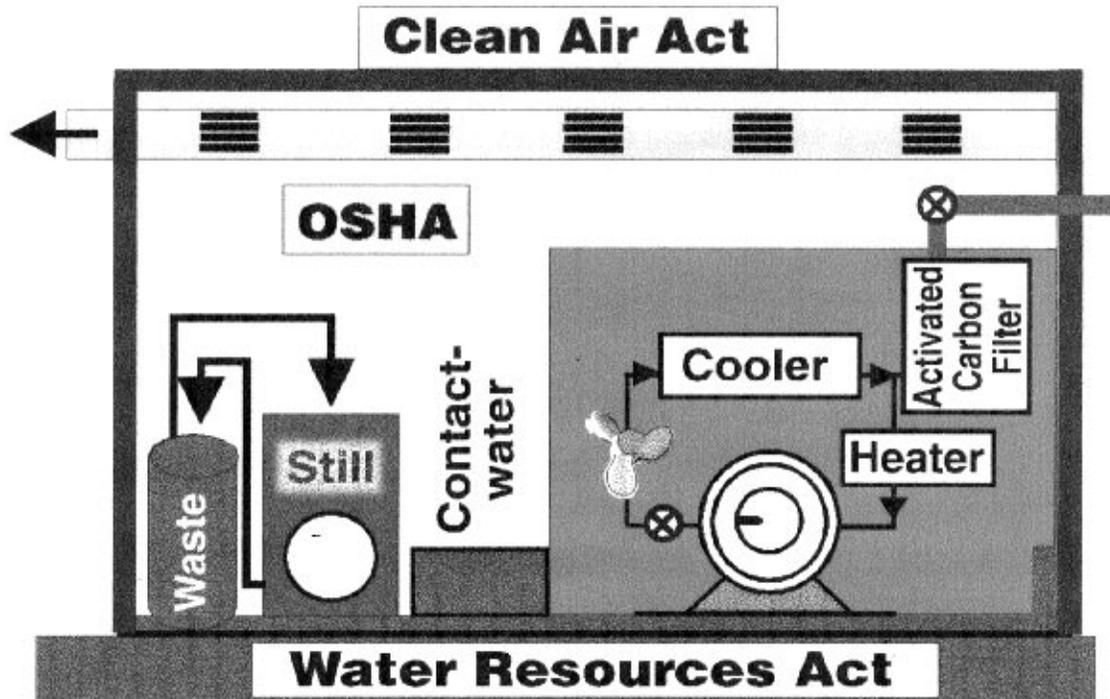
D Current and New Research Programs

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Environmental Regulations for the Drycleaning Industry

- **Clean Air Act**
- **Water Resources Act**

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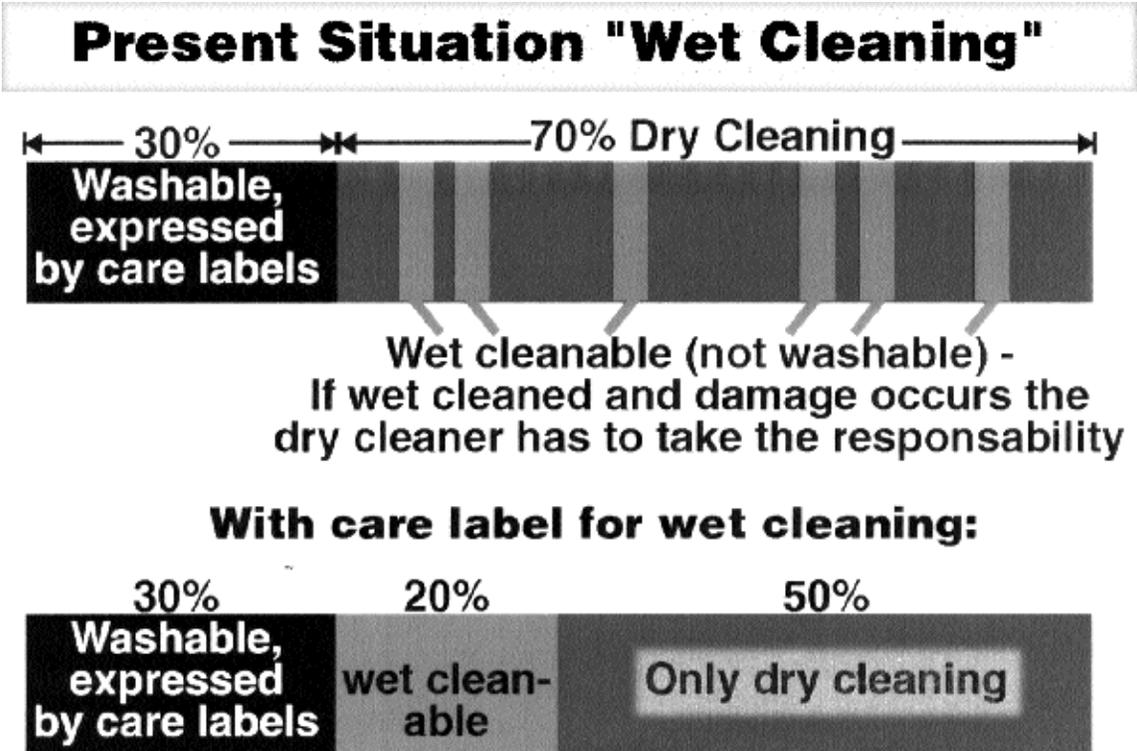
- A Market Data
- B Environmental Regulations
- C Present Situation**
- D Current and New Research Programs

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Present Situation "Solvents" in Dry Cleaning Industry

Water	Perchloroethylene	Carbon Dioxide
Washing Wet Cleaning	Dry Cleaning	in Development
	Petroleum Solvent	
	Dry Cleaning	

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- A Market Data
- B Environmental Regulations
- C Present Situation
- D Current and New Research Programs**

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Research Programs

Green Program:

- Water

Orange Program:

- Organic solvents
 - Perchloroethylene
 - Petroleum Solvents

Blue Program:

- Liquid / supercritical carbon dioxide

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Green Program

Scope:

Extension of the applicability of water based cleaning procedures

Properties of the Clothing

Harmonization of care properties

Treatment of Clothing in Dry Cleaning Plants

Improvement of wet cleaning technology

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Green Program

Harmonization of Care Properties in Cooperation with Apparel Industry

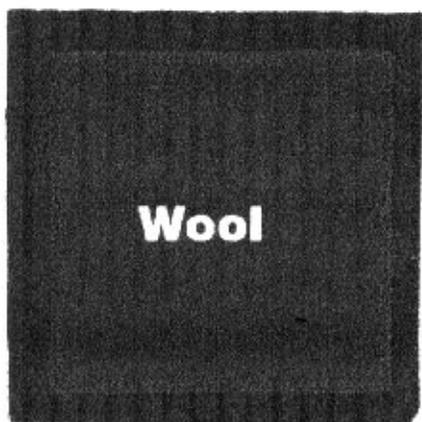
- Selection of fabrics in regard to color fastness, shrinkage and surface properties
- Selection of linings, interlinings, thread and accessories
- Design and workmanship

Period: 1996 and 1997

18

Green Program

Example



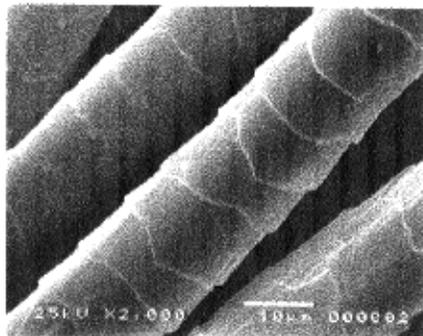
Before and after wet cleaning

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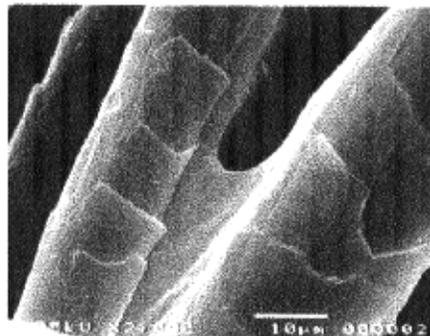
Green Program

Scanning Elektron Microscope

Magnification: x 2000



**Wool without
antifelting finish**



**Wool with
antifelting finish**

20

Green Program

Example



Rayon



**Rayon with
resin finish**

Before and after wet cleaning

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Green Program

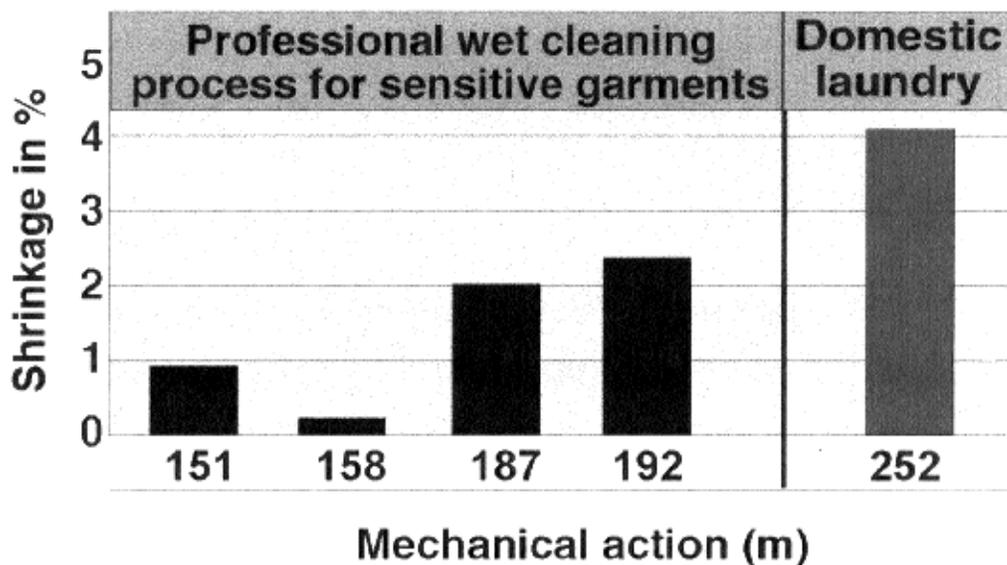
Treatment of Clothing in Dry Cleaning Plants

- Reduction of impact on textiles
- Optimization of soil removal
- Adequate finishing processes for wet cleaned garments

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Green Program

Example



23

Orange Program

Organic Solvents - Perchloroethylene -

Scope:

Reduction of emission into the atmosphere and ground water

Sources for Emission

**Dry Cleaning Machine
Still**

**Regulated by
Clean Air Act**

**Waste
Contact Water**

**Regulated by
Water Resources Act**

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Orange Program

Organic Solvents - Perchloroethylene -

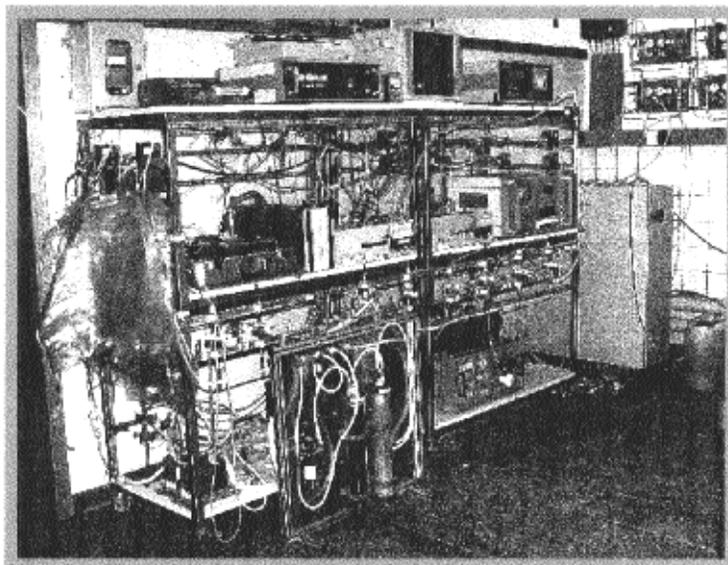
Current Research:

- **Development of cost effective devices to measure the concentration of perchloroethylene within the dry cleaning machine**
- **Reduction of residual perchloroethylene in cleaned garments**

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Orange Program

Organic Solvents - Perchloroethylene - Example



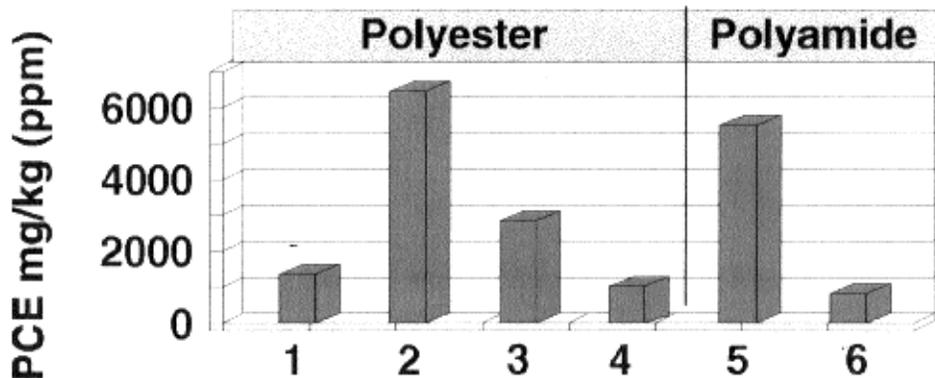
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Orange Program

Organic Solvents - Perchloroethylene - Example

Residual Perchloroethylene in Cleaned Garments:

Retention of adhesives in fusible interlinings



Recommendation to the apparel industry:
Do not use No. 2 and 5

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Orange Program

Organic Solvents - Petroleum Solvents -

Current Research:

- **Controlling of safety aspects under practical conditions in the dry cleaning industry**
- **Minimizing of the fire hazard of petroleum solvents**
- **Improvement of energy balance by combination of distillation with adsorption systems**

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Orange Program

Organic Solvents - Petroleum Solvents -

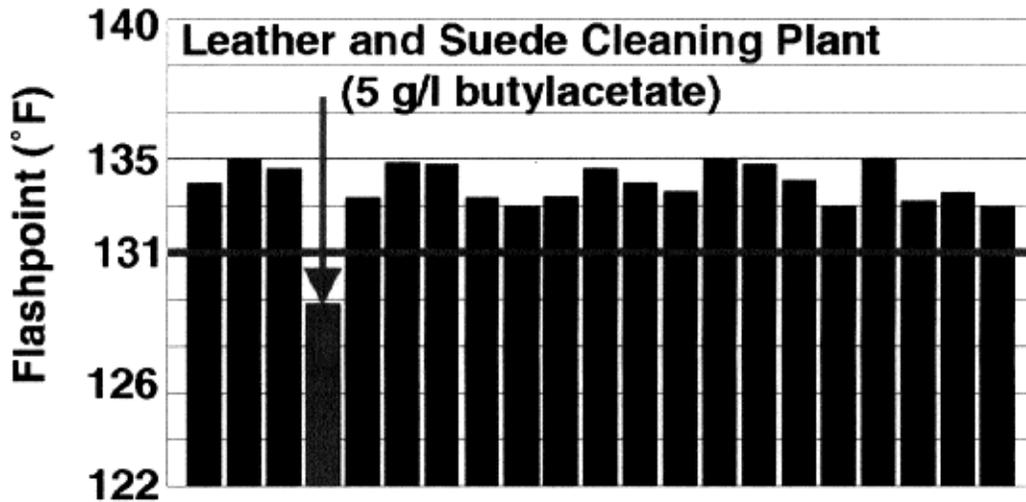
Controlling of Safety Aspects:

- Test Pannel:** 210 machines in 180 plants
- Solvents:** Isoparaffins in different modifications
- Test Parameters:** Flash point, boiling range, flash point decreasing and halogenated solvents, fatty acids, non-volatile residue, color

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Orange Program

Organic Solvents - Petroleum Solvent - Example



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Blue Program

Liquid Supercritical Carbon Dioxide

Current Research:

- Research on fundamental facts of the impact of CO₂ on apparel under practical conditions
- Development of a cost effective cleaning system consisting of drum, filtration unit, recovering unit and measurement devices
- Improvement of cleaning efficiency of the liquid resp. supercritical carbon dioxide

Blue Program

**"It was not so long ago that people
thought semiconductors were
part-time orchestra leaders
and microchips were very,
very small snack foods."**

Geraldine Ferraro

Textile Care Technology Spectra and Care Labeling Issues

Manfred Wentz

American Association of Textile Chemists and Colorists and Fabricare Legislative and Regulatory Education Organization

Dr. Wentz is Corporate Vice President of Research and Development and Environmental Affairs at R.R. Street & Co., Inc. in Naperville, Illinois. As a stakeholder in the U.S. Environmental Protection Agency's (EPA's) Design for the Environment Program Dry Cleaning Project, he co-chairs EPA's Dry Cleaning Technical Working Group for Cleaner Technology Substitutes Assessment. Dr. Wentz earned a Ph.D. in Fiber and Polymer in Science from North Carolina State University and a Professional Textile Chemistry and Engineering degree from the Technical Academy in Hohenstein, Germany.

Introduction

Apparel and textiles fulfill essential functional and aesthetic needs. Social-psychological, physiological, physical, cultural, and economic parameters traditionally influence apparel selection, purchasing, and wearing decisions. As we become more aware of the impact of our activities on the environment, questions about the interface between apparel and the environment are raised and enter into the decision-making process.

Apparel and textiles are soiled during normal use. Economic realities require that apparel and textiles be cleaned and refurbished for reuse without substantially altering their functional and aesthetic properties. Consumers have the choice to clean and refurbish apparel at home or have it done in professional cleaning establishments. It is essential that available cleaning processes maintain or restore the desirable and functional attributes of the textiles. This is the joint responsibility and opportunity of the textile and apparel industry, the textile care industry, and the consumer.

The Federal Trade Commission (FTC) promulgated a trade regulation rule on the care labeling of textile wearing and certain piece goods in 1971 and amended it in 1983. The rule requires that apparel items have a permanent care label that provides written information about their regular care. The purpose of the rule is to give the consumer accurate care information to extend the useful life of a garment.

The formation of the North American Free Trade Agreement between the United States, Canada, and Mexico provided the stimulus for using care symbols instead of words. The American Society for Testing and Materials has developed laundering and dry

cleaning symbols which the FTC is about to implement. FTC's current rule requires that manufacturers and importers of textile wearing apparel have a reasonable basis and reliable evidence in support of care instructions. Both subjective and objective selection criteria are allowed.

This presentation outlines the complexity of textile care and addresses the difficulties encountered in defining reliable care instructions. Conceptual textile care spectra for nonaqueous and aqueous cleaning processes will be presented and technology options, cleaning mechanisms, textile property issues, and garment damage potentials will be discussed.

Discussion of Textile Care Process Spectra

Textile Care Process Spectrum: Technology Options

At the Hamilton Environmental Summit in 1993, textile cleaning was redefined as a generic process. This redefinition dispels the paradigm that dry cleaning means cleaning in perchloroethylene (perc) only. To initiate textile cleaning, we must break the soil-textile interaction forces to loosen and transport the heterogeneous soils away from the textiles. It does not matter if the medium is a liquid, a gas, or even a solid. We must be able to purify and reuse the chosen medium. The soils should be concentrated for proper disposal, preferably as nonhazardous waste. But what is more important, the process must clean clothes to satisfy consumer needs, and it must be economically feasible and environmentally acceptable. Today, let

us consider two practical boundary technologies: nonaqueous and aqueous cleaning.

Nonaqueous Textile Cleaning

There will always be a need for a nonaqueous textile cleaning technology. It is dictated by the properties of textiles and soils, but the medium does not have to be perchloroethylene only. We know that perchloroethylene is a proven medium for professional textile cleaning. Any other nonpolar media, such as petroleum, carbon dioxide, or other nonpolar liquids, which meet the textile cleaning performance requirements, could be chosen.

Aqueous Textile Cleaning

At the other end of the spectrum is aqueous cleaning. We showed that the advanced professional wet cleaning technology makes it feasible to clean many textiles that are traditionally cleaned in nonaqueous media. The challenge for our industry is to prove that this professional aqueous cleaning technology offers sufficient advantages to consumers so that they do not do more wetcleaning at home.

Textile Care Process Spectrum: Cleaning Mechanism

Colloid chemistry in nonaqueous and aqueous media allows satisfactory textile cleaning. The mechanisms which govern polar, nonpolar, and particulate soil removal are reasonably understood for both media. We know that polar soils are more easily removed in water than in nonpolar solvents and that nonpolar soils are more easily removed in nonaqueous solvents. Professional textile cleaners can optimize soil removal if they have access to both media.

Textile Care Process Spectrum: Textile Properties

The structure and properties of fibers, yarns, fabrics, and colorants ultimately determine which cleaning process is best for them. Professional cleaners cannot change textile properties, but they must know as much as possible about them in order to choose the best textile cleaning process. The spectrum of textile properties dictates which cleaning process technology (nonaqueous or aqueous) is best to maintain desirable textile attributes.

Textile Care Process Spectrum: Preferred Methods for Garments

Based on field studies, we established preferred methods for cleaning specific garments. Tailored or

structured garments and high fashion items often have linings, interfacing, trims, and other accessories or have complex design features. They often behave differently in the same cleaning medium. Damage to these items is less likely to occur in nonaqueous media than in aqueous cleaning media. Thus, these garments are best cleaned in a nonaqueous media. Many garments, such as overcoats, trousers, raincoats, parkas, or sweaters may be cleaned in either media. Shirts, blankets, sleeping bags, and linens are best wetcleaned. Occasionally, excessive polar or nonpolar soiling dictates and overrides textile cleaning media selection criteria.

Textile Care Process Spectrum: Garment Damage Potential

A deviation from care label instructions increases the risk of garment failure. We do not recommend it, but each operator, of course, has the option to ignore care instructions. But if the cleaner damages a garments, they will be responsible for it. The potential damage to garments during cleaning is generally higher with aqueous media than with nonaqueous media. This fact is the major reason why dry cleaning is so highly utilized. Often, manufacturers low-label their garments as "Dry Clean Only" to reduce garment damage and to ensure customer satisfaction during the use of their products. I would now like to discuss the more important types of garment damage that can occur.

Practical Shrinkage Potential

When garments shrink more than 2 or 3 percent, the garments do not fit well anymore and consumers will notice it. Shrinkage can occur during the cleaning, drying, or finishing process. The new wet cleaning technology optimizes and controls the well-known process parameters to reduce shrinkage: time, mechanical action, heat, and chemistry. Practicing textile care specialists classify shrinkage into two categories: felting and relaxation.

Felting Shrinkage: This type of shrinkage is unique to wool because wool fibers have surface scales that cause differential friction effects. When wool fibers swell, as they do in water, the scales expand and are lifted. This increases differential friction between fibers and interlocks and compacts them which causes felting shrinkage. It is possible to reduce but not eliminate the felting potential of wool with process additives that lower interfiber friction and reduce fiber swelling.

Relaxation Shrinkage: During fabric and garment manufacturing, textiles are often stretched, shaped, and dried under tension. This causes latent stresses at

the macroscopic level (between fibers and yarns) and at the microscopic level (within the fiber morphology). The macroscopic stresses are generally relaxed by mechanical action that allows movement between fibers and yarns. Microscopic stress is released by plasticization. Plasticization occurs when fibers swell in a liquid medium or when excessive energy (heat) is applied during drying. Either action lowers the cohesive energy between amorphous polymer segments and causes relaxation within the fiber matrix, leading to shrinkage.

Theoretical Aspects of Shrinkage

Like all processes in nature, shrinkage is governed by the potential that it can occur (thermodynamic) and by the rate at which it can occur (kinetics). These aspects are fundamental issues in polymer science and have been studied and documented extensively for natural and synthetic fibrous polymers.

Thermodynamics theory predicts that there is a balance between cohesive energy and entropy when a process is at equilibrium. The cohesive energy between molecules retains the shape and dimension of a fibrous polymer solid, while the entropy opens it and allows the segmental relaxation that leads to shrinkage. This balance establishes the fibrous shape and stability that is disturbed and temporally fixed into a non-equilibrium position during textile and garment manufacturing.

When fibers swell in a liquid or are heated above their glass transition temperature during cleaning or drying in air, cohesive energy force weakens and entropy forces dominate. This relaxes the morphology and the fibers shrink. But because polymeric fibers are visco-elastic, the thermodynamically feasible end points are not reached instantaneously. Under these conditions, the kinetics of the process will determine the dimensional properties of fibers. Therefore, we can only delay relaxation shrinkage during textile cleaning, we cannot stop it.

The practical consequence is that relaxation shrinkage takes time and occurs cumulatively over several cleaning cycles. All textile cleaning professionals are very familiar with the phenomenon and know it as progressive shrinkage. If we can find a cleaning and finishing process that delays perceivable relaxation shrinkage long enough to exceed a garment's life cycle, consumers will be satisfied. Nonaqueous cleaning does this readily, but it is much more difficult to manage with aqueous cleaning.

The research efforts and assessment of the feasibility of professional wetcleaning within the Research Committee RA-43 of the American Association of

Textile Chemists and Colorists will focus on practical and fundamental principles of shrinkage. This will allow us to establish fundamental guidelines for shrinkage prediction and control.

Potential Appearance and Tactile Changes

Consumers purchase new textiles based on visual and tactile perception. Cleaning experts strive to retain or restore the physical properties that cause the desirable sensory attributes of textiles triggering positive purchasing decisions. This means to retain the original colors, textures, and finishes during cleaning, or to restore them if undesirable changes have occurred. Again, it is easier to retain these properties during nonaqueous cleaning than during aqueous cleaning.

Claims that dye bleeding and staining can be prevented need to be verified. While it is possible to control selective colorant removal and staining, the diverse nature and properties of colorants and textiles suggest that it will be difficult to live up to such a broad claim. The real issue here is proper dyeing and colorfastness evaluation during textile manufacturing. Textile and apparel manufacturers, retailers, and textile care specialists must work together to establish quality and test protocols that predict satisfactory cleaning performance of textiles.

Most dry cleaners use fabric finishes to restore or improve the hand and feel of drycleaned fabrics. Fabric finishes for aqueous cleaning are also available to achieve the same desirable effects.

Summary

1. Textile care professional need access to nonaqueous and aqueous cleaning technologies.
2. Care label instructions can be derived from objective national and international test methods.
3. Conceptual textile care spectra for nonaqueous and aqueous processes can assist in selecting proper textile cleaning processes.
4. Garment shrinkage potential can be explained by considering practical and theoretical principles.
5. National and international organizations coordinate their efforts to establish objective test methods for care label instructions.
6. It is necessary to work closely with all members of the apparel industry to optimize garment performance as new textile care processes emerge.

1

Textile Care Spectra & Care Labeling

Dr. Manfred Wentz

**Apparel Care and The
Environment**
Washington, DC
September 9-10, 1996



2

Criteria for Selection and Use of Clothing:

- ▶ **Social - Psychological**
- ▶ **Aesthetic**
- ▶ **Cultural**
- ▶ **Physical**
- ▶ **Economics**

3

Traditional Criteria Expanded:

- ▶ **Care Requirements:**
 - ▶ home laundering
 - ▶ drycleaning
 - ▶ professional wetcleaning
- ▶ **Environmental Concerns**

4

All Members of Apparel Chain Affected:

- ▶ **Fiber, Yarn & Fabric Producers**
- ▶ **Apparel Manufacturers**
- ▶ **Retail Industry**
- ▶ **Textile Care Industry**

5

Care Labeling Rule Requirements:

- ▶ **Care labels must give full instructions for at least one satisfactory method of care**
- ▶ **Must give warning about any part of the recommended care method that would harm the garment**

6

Care Labeling Rule Requirements *(continued)*:

- ▶ **State when there is no method for cleaning without damage**
- ▶ **Must have a reasonable basis for care instructions**

7

Reasonable Basis Requirement for Care Labeling:

- ▶ **Reliable Evidence That:**
 - ▶ **product not harmed after repeated cleanings as recommended**
 - ▶ **product was harmed when cleaned by method warned against**

8

Reasonable Basis Requirement for Care Labeling (*continued*):

- ▶ **Reliable Evidence That:**
 - ▶ **product was successfully tested**
 - ▶ **technical literature, experience or expertise supports care instructions**
 - ▶ **other evidence**

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Care Label Instructions Can Be:

- ▶ **Subjective**

- ▶ **Objective**

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Care Label Instructions Based on Subjective Judgments:

- ▶ **Risky, more likely to be wrong**

- ▶ **Relatively inexpensive**

- ▶ **Method of choice for short runs**

- ▶ **Low labeling more likely**

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Based on Objective Testing:

- ▶ **More reliable if done right**
- ▶ **Relatively expensive**
- ▶ **Method of choice for long runs**
- ▶ **Low labeling less likely**

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Objective Test Methods Available:

- ▶ **American Association of Textile Chemists & Colorists (AATCC)**
- ▶ **American Society for Testing & Materials (ASTM)**
- ▶ **International Organization for Standardization (IOS)**

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Textile Care Process Options:

- ▶ **Non-Aqueous Cleaning**
 - ▶ non-polar solvents

- ▶ **Aqueous Cleaning**
 - ▶ polar solvent

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Requirements for Any Textile Cleaning Process:

- ▶ **Must Clean Clothes Satisfactorily**

- ▶ **Must Extend Useful Life of Garments**

- ▶ **Must be Economically Feasible**

- ▶ **Must be Environmentally Acceptable**

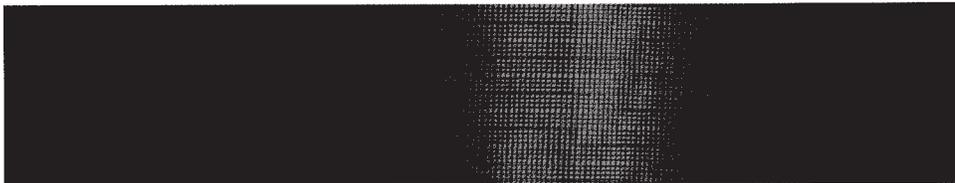
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Textile Care Process Spectra:

- ▶ Technology Options
- ▶ Cleaning Mechanism
- ▶ Textile Property Issues
- ▶ Preferred Methods for Garments
- ▶ Garment Damage Potential

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Textile Care Process Spectrum Technology Options



Non-aqueous Cleaning

- ▶ Perc
- ▶ Petroleum
- ▶ Carbon Dioxide (?)
- ▶ Others (?)

Aqueous Cleaning

- ▶ Manual
- ▶ Machine
 - ▶ Household
 - ▶ Commercial

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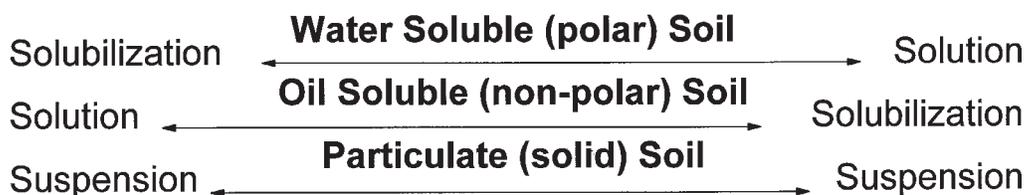
17

Textile Care Process Spectrum Cleaning Mechanism



Non-aqueous Cleaning

Aqueous Cleaning



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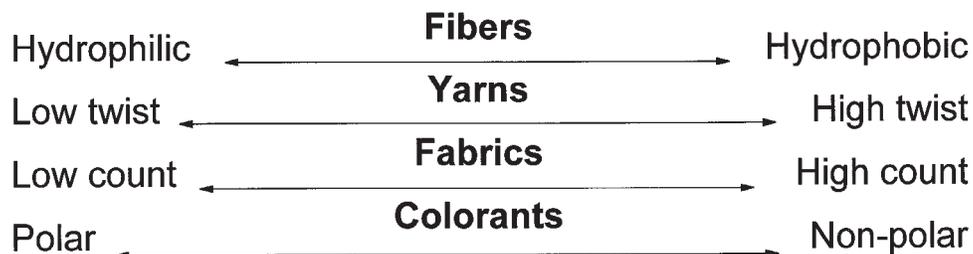
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Textile Care Process Spectrum Textile Property Issues



Non-aqueous Cleaning

Aqueous Cleaning



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Textile Care Process Spectrum Preferred Methods for Garments



Non-aqueous Cleaning ← → *Aqueous Cleaning*

Men's Suits	Overcoats	Parkas	Shirts
Women's Suits	Trousers	Windbreakers	Blankets
Tailored Jackets	Dresses	Raincoats	Sleeping Bags
Fashion Items	Skirts	Sweaters	Linens

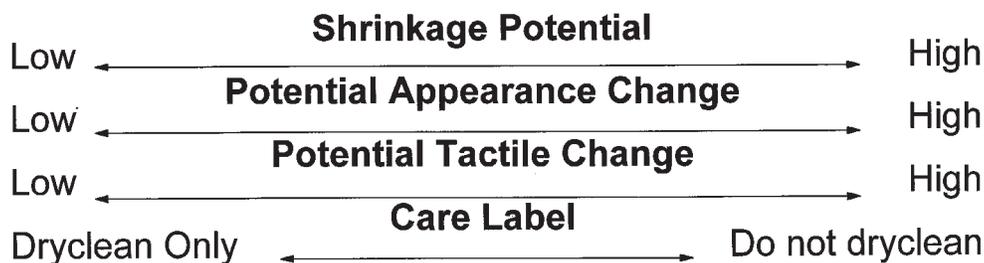
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Textile Care Process Spectrum Garment Damage Potential



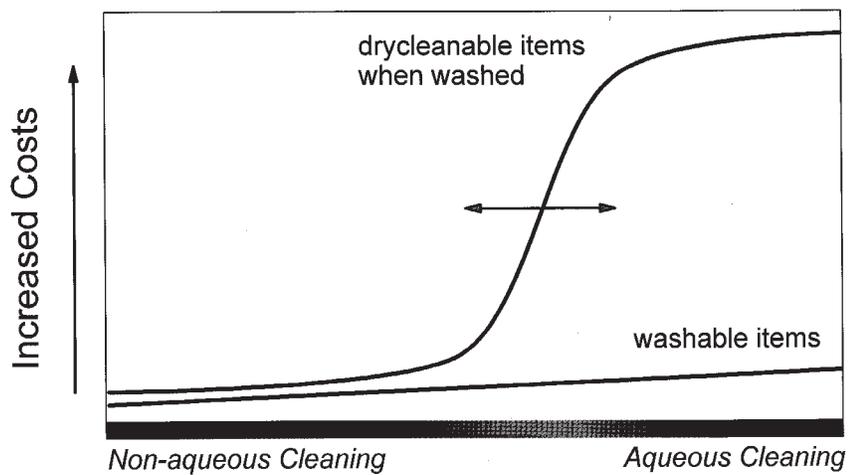
Non-aqueous Cleaning ← → *Aqueous Cleaning*



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Textile Care Process Spectrum Finishing Costs



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Mechanisms of Shrinkage

- ▶ Felting
- ▶ Relaxation
- ▶ Thermal

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Felting Shrinkage

▶ Mechanism

- ▶ **scales of wool cause differential friction**
- ▶ **leads to interlocking and felting of fibers**

▶ Minimization

- ▶ **lower inter-fiber friction with additives**
- ▶ **reduce mechanical action**

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Relaxation Shrinkage

▶ Mechanism

- ▶ **water plasticizes fiber structure**
- ▶ **releases latent tension in fibers and yarns**

▶ Minimization

- ▶ **can only be delayed, not stopped**
- ▶ **reduce mechanical actions**

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Thermal Shrinkage

▶ Mechanism

- ▶ heat plasticizes hydrophobic fiber structure**
- ▶ releases latent tension in fibers and yarns**

▶ Minimization

- ▶ keep all process temperatures below glass transition temperature**

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Color Fastness of Textiles:

- ▶ Mode of Application (dyeing, printing)**
- ▶ Solubility Properties of Colorant**
- ▶ Dye Transfer Potential**

27

Conclusions:

- ▶ **Textile care professional need access to non-aqueous and aqueous cleaning technologies**
- ▶ **Care label instructions can be derived from objective national and international test methods**

28

Conclusions (*continued*):

- ▶ **Conceptual textile care spectra for non-aqueous and aqueous processes can assist in selecting proper textile cleaning processes**
- ▶ **Garment shrinkage potential can be explained by considering practical and theoretical principals**

Conclusions *(continued)*:

- ▶ **It is necessary to work closely with all members of the apparel chain to optimize garment performance as new textile care processes emerge**
- ▶ **National & international organizations coordinate their efforts to establish objective test methods for care label instructions**

Report of Professional Wet Cleaning in Europe

Kaspar D. Hasenclever

Kreussler Chemical Manufacturing Company, Weisbaden, Germany

Mr. Hasenclever is Managing Director of Kreussler, a chemical manufacturing company in Germany. He is chairman of the scientific advisory board of the Laundry Research Institute, Krefeld and member of the DIN Committee of Standardization. Mr. Hasenclever works in research and development of detergents and textile chemicals as well as in process technology for laundry and dry cleaning. Mr. Hasenclever has a Diploma in Engineering in Textile Chemistry from the Textile Engineering School at Krefeld, Germany.

When dry cleaning was discovered some 120 years ago, neither manmade fibers nor dimensionally stabilizing finishing processes were available. Dye fastness was poor, sewing techniques and garment construction gave little consideration to aftercare, and fashion was not anywhere near as user-oriented as today. This is not to mention the then-current laundry equipment technology, processes, and the standard detergent—soap.

For a great proportion of textiles in general use, washing would spell complete ruin. The discovery of dry cleaning thus meant progress and provided an answer to textile care problems. With the application of modern technology, today's textile items are closely oriented to serviceability. Choice of material, design, cut, dyes, wear-comfort, and aftercare methods all meet the needs of the user. Textile retailers and manufacturers research such aspects very thoroughly, in order to offer attractive incentives for purchase of new textile items. Simple problem-free care possibilities are an important consideration.

The selling point of "easy-care" calls for textiles to be cleanable with normal domestic methods. This is the reason why only a minority of outerwear textiles today are not washable. This proportion too, is continuously getting smaller since trends are towards the natural looking fabrics, ecological labeling, and protection of the environment.

With most garments, the textile care industry is in competition with domestic alternatives and has to rival its quality features, efficiency, acceptance, and availability. During the past 10 years, the textile care industry has constantly decreased its share of the outerwear market. The new wet cleaning technology offers the industry an opportunity to regain its ability to compete

in the areas of quality, material conformity, efficiency, and acceptability. Looked at in this way, the use of wet cleaning in textile care is of vital importance for future development in this sector.

Soiling

In central Europe, outerwear is mostly soiled by air pollution, body excretions, foodstuffs, and direct dirt contact. Slide 1 provides data about approximate distribution of quantities, components and solubility.

Slide 1

Slide 1 shows that only about 10 percent of soiling on outerwear is soluble only in solvents. Some 40 percent is water-soluble, and the greater proportion consists of pigments. Thus it already becomes clear how advantageous a combination of water and surfactants is for removal of soiling from textiles and how much more demanding are the conditions for using solvents. In order to remove water-soluble straining during cleaning with solvents, the addition of water as well as detergent is necessary. At the same time that these water additions are active in cleaning, they also cause natural fibers to swell and so increase risk of shrinkage.

Slide 2

Slide 2 shows the absorption of moisture by fabrics depending on the relative humidity as well as the swelling produced as the maximal cross-section increases.

The most interesting aspect is the difference in water content of the fibers between that at 90 percent relative

humidity and the maximum value. It is here that the fundamental difference lies between wet cleaning and use of solvents, at least when "water-based soiling" (meaning soiling from body excretions, food, drink etc.) has to be removed with solvents.

Water absorption by textiles in solvents is directly proportional to the relative humidity in the air space of a dry cleaning machine. Immediately after one employs water additions of as little as 1 percent to 1.5 percent of the weight of work, this results in relative humidity of 85-90 percent which then leads to corresponding fiber swelling. This is to say that fiber swelling occurs even with the use of solvents. At 90 percent relative humidity, it is only a little below the maximum swelling for viscose, silk, cotton, and acetate.

Wet Cleaning as a New Processing Technique

In December 1991, during a trade press conference at Kreussler in Wiesbaden, the **LANADOL process** based on Kreussler patents was introduced jointly by Miele and Kreussler.

In November 1993, this new technology was honored with an award for innovation by the Hesse Minister of Economics, Technology, and Transport. Based on the experience of more than 500 users of wet cleaning machines, one can make the following comparisons with solvent processes:

- Better cleaning effects.
- Clearer colors.
- Fresher smell for cleaned work.
- Lower costs.
- Enhanced service capability.
- Unanimous acceptance by customers.
- Greater risks with "non-washables."
- Increased finishing requirements for multi-layer garments.
- Longer completion time.

The majority of companies where wet cleaning machines are installed also operate solvent cleaning in parallel. During the summertime approximately 50-70 percent of garments can be wetcleaned without risks. During winter, that rate drops to 30-50 percent. The other articles—mainly suits and costumes—will be

processed using solvent. The advantages of wet cleaning include lower investment and processing expenditure, better cleaning quality, and higher customer satisfaction.

Approximately a third of the 500 plants using wet cleaning, use the process exclusively to handle those articles which present problems when treated in solvent: microporous membrane fabrics, sports and rain-protective clothing, very heavily soiled articles, or special classifications. Although such items comprise only some 30 percent of the total intake, this option saves about 50 percent of the solvent, because the portion of the workload which is being wetcleaned is that which would otherwise be responsible for particularly high solvent loss.

Of those cleaners using wet cleaning, only a minority are working exclusively with these process and thus no longer use solvents. In some cases, occasional items considered risky will be drycleaned by a co-operative companies, but most of the time the cleaners can cope on their own. Most of the cleaners working in this way report reduced costs and increasing demand.

Slide 3

This gives an impression, about the proportion of wet cleaning, which is already realized at European textile cleaners. But the possibility of wet cleaning is much more. Slide 4 shows the kind of garments people normally wear or use. The slide shows the preference of the best cleaning method—wet cleaning or dry cleaning.

Slide 4

The result: most of the garments of the day-by-day use are better wetcleaned than drycleaned.

Primary Needs

Textile cleaning is necessary in terms of hygiene and attractiveness, but is irksome because of the effort and expenditure involved. The primary needs are cleanliness, shape, and finish. With easy-care textiles, cleanliness can to a large extent be achieved in the household without difficulties. Shaping and finishing are sometimes very laborious. It is here that the usefulness of professional cleaning becomes evident. Conventional professional cleaning processes using solvents have system-related advantages as far as shape and finish are concerned but disadvantages with cleanliness and hygiene aspects.

This gap is closed by wet cleaning. In cleanliness and hygiene, it is equal to the high standard of house-

hold care, while for shape and finish it offers all the advantages of professional cleaning to the customer.

Service Range Profile in Textile Cleaning

Compared with easy-care processes in domestic washing machines, wet cleaning offers considerable advantages. The mechanical stress is clearly less. In addition to comprehensive cleaning efficiency, the chemicals which are used provide considerable fiber protection, color stabilization, and retexturing, and give an anti-electrostatic finish. With appropriate electronic control of dryers, the maintenance of form and shape in easy-care textiles is ensured so that finishing effort is lower, even in comparison with a solvent process.

For this category of easy-care textiles, wet cleaning offers considerable qualitative advantages compared with domestic care; costs are also clearly lower compared to conventional solvent processing.

Wet Cleaning therefore provides an opportunity to widen the range of services for the textile care trade. This would involve introducing a special service of easy-care articles, in addition to the established cleaning of high-value garments which are not washable and thus justify the appropriate expenditure and costs. Only in this way could a clearly lower price level be achieved that would be attractive to customers on a cost basis.

Opportunities for Wet Cleaning

Anyone who raises the question of what proportion of garments handed in for cleaning can be processed with wet cleaning and what proportion must be cleaned in solvent, has not fully understood either the challenge to the cleaning industry's future or the opportunities of wet cleaning. As a new processing method, wet cleaning must be viewed as dynamic, not

static. It offers an extension to professional dry cleaning's capacity.

A wet cleaning installation provides the capability for a complete processing spectrum ranging from silk articles, knitted wool garments, practically all trousers and skirts, all easy-care articles, jeans, household textiles, bed linen, pillows, shirts, towels, and table linen.

Wet cleaning therefore broadens the profile of services from pure dry cleaning of conventional outerwear to the comprehensive handling of all cleaning requirements for private households. This brings new customer contacts. This in turn leads to greater volume. It takes the cleaner out of a narrow niche into becoming a general provider of services for customers' textile needs. It should furthermore be taken into consideration that competitively priced processing of easy-care textiles will also inevitably lead to increased turnover in conventional dry cleaning work.

Why not offer a special service for easy-care goods with new approaches and precisely tailored pieces, to entice people who are using their household washing machines to return once more to the trade. If such customers find satisfaction they will come back and bring their conventional clothing—in addition—for cleaning.

Such consistent use of wet cleaning demands completely new thinking from the dry cleaner, however. It is thus quite possible to break up present structures and win new customers. We must be aware, however, that these "new" customers also need new reasons to have their cleaning done. In addition to gains in quality of life and free time, arguments can be based on care for the environment and on textiles retaining their value. In practical terms, professional wet cleaning is more effective than home processing, while offering a guarantee of safety and efficiency through specialist processing techniques and trained operators.

From this standpoint, wet cleaning is also an entrepreneurial challenge. Even without an appropriate care symbol for wet cleaning an absolute imperative we must not forget that commercial textile cleaning offers advantages, even for easy-care textiles. Why should we not take up this market actively?

1

Table 1
Average soiling of garments In Europe

Soil type	Proportion	Solubility	Components
Pigments	50 %	not	dust, soot, metaloxides, rub-off, pollen, aerosols
Polar subst.	30 %	water	sugar, salt, drinks, body excretions
Polymers	10 %	water	starch, albumen, milk, food
Oils/Fats	10 %	solvents	skin grease, resin, wax, oils, fats

2

Table 2
Water content in Textile fabrics dependent on relative humidity

Fibre	relative humidity			swelling
	70%	90%	max.	
viscose	14,1%	23,5%	24,8%	115%
wool	15,6%	22,2%	28,7%	39%
silk	11,2%	16,2%	17,7%	31%
cotton	8,1%	11,8%	12,9%	43%
acetate	5,4%	8,5%	9,3%	62%
polyamide	5,1%	7,5%	8,5%	11%
acrylic	2,1%	4,0%	4,8%	9%
polyester	0,5%	0,6%	0,7%	0%

3

Table 3
Proportion of Wet Cleaning in European Textile Care

Proportion	kind of garments	Users
20 - 30%	"washable" textiles	50%
35 - 50%	easy finishing	35%
70 - 80%	no high risks	15%

4

Table 4
Preference of Cleaning Method dependent on Kind of Garments

better for dry cleaning	SUITS WOOLEN JACKETS COSTUMES WOOLEN COATS
equal dry/wet clean	TROUSERS SKIRTS DRESSES PULLOVERS COATS
better for wet cleaning	RAINCOATS ANORAKS SPORTSWEAR JACKETS BLOUSES JEANS
new business	SHIRTS TABLE LINEN BED LINEN DUVETS PILLOWS

Report on the European Wet Cleaning Committee

Walther A. J. L. den Otter

TNO Cleaning Research Techniques Institute, Delft, The Netherlands

Mr. den Otter is Manager of the Dry Cleaning Department at the Cleaning Techniques Institute. He is developing alternative cleaning methods for dry cleaning, as well as cleanup methods for soil and ground-water pollution. In addition, he serves in a workgroup of the Dutch Ministry formulating the update of the General Administrative Order (Dutch Environmental Act) involving safe working conditions for the Dutch dry cleaning industry. Mr. den Otter holds Engineering and Physical Chemistry degrees from a technical college in Amsterdam.

I have been a research manager and senior adviser at the TNO Cleaning Techniques Research Institute in Delft, The Netherlands for 26 years. Wet cleaning has been one of the major areas of our activities, and will continue to be so in the near future.

Throughout Europe, discussions have been taking place about wet cleaning. IDRC (a collaborative bond of European institutes for dry cleaning) and CINET (an international committee on textile care), has discussed this subject extensively. The heart of the matter is how to show consumers that garments have to be treated by a professional wet cleaner; it is absolutely necessary to distinguish between washing and wet cleaning.

The members of IDRC and CINET unanimously agree an adequate care label must therefore be developed. Efforts to produce a wet cleaning label, and a test method which satisfies the demands of wet cleaning, have to be discussed at a national and international level.

In order to create a professional platform for European discussions and decisions, British, Dutch, German, and Swedish research institutes organized a summit held in Delft on October 23, 1995. At this summit, after intensive discussions of all technical possibilities and operational requirements, the European Wet Cleaning Committee (EWCC) was founded. In addition to providing a professional platform, EWCC's aim is to establish wet cleaning as an adequate cleaning method in the field of dry cleaning, without the risk of textile damage. The founding members of the EWCC are the European members of the IDRC, members of CINET, and the European Manufacturers Council (a group of manufacturers of special innovative textiles and garments). EWCC associated members include

manufacturers of wet cleaning machines/systems, supplier of detergents, and companies which can contribute technical and organizational expertise. The founding of EWCC created a professional platform on which factual and objective discussions and preparations for the wet cleaning care label can take place.

One of the aims of EWCC is the development of an official, accepted care label symbol indicating that a garment can be wet cleaned. In order to create this care label symbol, a test method must be defined. This test method would be used to test garments to see if they can be wet cleaned safely. If the garments pass this test, they can obtain the wet cleaning care symbol.

At the moment, a label for wet cleaning has been determined by GINETEX for three categories: normal, gentle, and very gentle processes. For the label to be used, a test method is required. For this test method to be established, a round robin trial (RRT) is necessary.

An RRT is a test in which different laboratories participate in order to discover the reliability and reproducibility of the specific test method. Most RRT's are performed more than once, since during the process of a trial, improvements in the test method will emerge. In the case of EWCC's RRT, the draft test method had already gone through a first trial to optimize the method.

The 11 participants of EWCC's RRT are:

- *Research institutes:* FCRA (United Kingdom), Forschungstitut Hohenstein (Germany), IFP-TEFO (Sweden), TNO Cleaning Research Techniques Institute (The Netherlands), WFK Forschungsinstitut für Reinigungstechnologie (Germany).

- *Machine/system manufacturers:* Electrolux (Sweden), John Laithwaite Association (United Kingdom), Miele & Cie. Professional (Germany).
- *Detergent and agent suppliers:* Busing & Fasch (Germany), Kreussler (Germany), Chemische Fabrik Seitz (Germany).

In the first EWCC RRT, two processes were tested: a gentle process for sensitive materials and a very gentle process for very sensitive materials. The RRT tested the dimensional change that occurs with wet cleaning. The 11 participants of the RRT used five different types of machine systems (Miele, Electrolux, Boewe, Aquatex, and Ipso). Each type of machine has different processes and mechanical actions. In the RRT, it must be proved that the same results can be obtained with different machines and program designs. To limit the number of variables in the RRT, process parameters were fixed: washing and drying times and temperatures, liquid ratio, loading ratio, ballast and detergent.

The gentle process was:

wash	pre wash	30°C	5 min.
	pump off		
	main wash	30°C	10 min.
	spin		
	rinse	cold	5 min.
	pump off		
	spin		
drying	inlet temperature	60°C	
	drying to 12-15 percent residual moisture		

The liquid ratio had to be 5 liters-per-kilogram (kg) load and the loading ratio 1 kg load in 25 liters volume.

The very gentle process was:

wash	main wash	30°C	10 min.
	spin		
	rinse	cold	5 min.
	pump off		
	spin		
drying	inlet temperature	40°C	2 min.

The liquid and loading ratios of the very gentle process were the same as in the gentle process.

To determine shrinkage, the processes were performed on an untreated woven wool fabric of the International Wool Secretariat (IWS) called A1 wool. This wool is especially prone to shrinkage, therefore differences between processes can be seen easily. Of course, such wool will not be used for garment manufacturing. The shrinkage in the test method is measured relative to a household washing process. The aim of the first RRT was for the gentle wet cleaning process

to have a 60 percent shrinkage rate as compared to home laundering, and for the very gentle process to have shrinkage rates of 30 percent. The shrinkage rate is determined after one to five complete (washing and drying) wet cleaning cycles.

Slide 6 shows the results of the RRT for the gentle process. In this figure, the results of the participants with similar machines are grouped together. The results are given for each of five (and in some cases six) complete wet cleaning cycles. The shrinkage listed in Slide 6 is the area felting shrinkage of the IWS wool test pieces. The x-axis represents the different laboratories and the y-axis the percent of area felting shrinkage.

One laboratory had very high shrinkage values. In evaluating the process parameters, it became clear that the cause for this high level of shrinkage was that the rinsing part of the process was carried out without detergent and the mechanical action in this particular process (pumping off) was very high. These results show two important parameters for wet cleaning which negatively influence shrinkage. Slide 7 shows the same type of figure for the very gentle process.

These results show us that in order to receive low shrinkage levels, special attention must be given to the performance of the wet cleaning process; washing without special settings and additives results in a much higher shrinkage level.

An inventory of the process conditions of the different participants revealed a number of differences in the process conditions. These differences may be the reason for the variations in results. The first difference is the type of machines used. However, there are still differences in the results from the same type of machine.

Causes for these differences might be:

- The mechanical action during washing.
- Rinsing with or without detergent.
- The centrifugation speed.
- To reach the goal of 12-15 percent residual moisture, drying time for different participants ranged from 4.5 to 11 minutes.
- The hardness of the water at different sites varied from 1 to 20 degrees DH (A German method for measuring hardness).

As this was the first RRT and there were many possible causes for differences in results, the participants were all satisfied with the results. They laid the groundwork for a second RRT which is more defined than the first. For example, in the gentle process in the second RRT, drying time is restricted to a maximum of

7 minutes (in case a 12 to 15 percent residual moisture has not been reached), with 5 minutes being the preferred amount of time. The pH and the hardness of the water will be measured, and the amount of detergent is specified more precisely. The detergent used in the RRT is a solid and becomes a liquid by warming it to 25-30°C. In the first RRT, we noticed variations in the way detergent was used. One participant dissolved the detergent in water. Others heated the detergent and poured it into the detergent hopper. For the second RRT, detergent will be dissolved in 25-30°C water and the detergent hopper will be rinsed with warm water.

During the wet cleaning process, shrinkage occurs during the washing cycle as well as the drying cycle. In the first RRT, a few of the participants measured shrinkage after the washing and drying parts of the process separately. Approximately 75-95 percent of the total shrinkage occurs in the washing part of the wet cleaning process, if the settings for drying are installed well.

Another result of the first EWCC RRT was the shrinkage of a gentle wet cleaning process was only approximately 50 percent of the shrinkage resulting from household washing machines. For a very gentle wet cleaning process, it was only about 25 percent. That's why there's an urgent need to distinguish between washing and wet cleaning.

The results of the first RRT allowed the EWCC to optimize the test method for wet cleaning for the second RRT, which will lead to the development of a care label symbol for wet cleaning.

The manual of the second RRT specifies

Composition of the ballast:	50 percent PES/50 percent CO
Reference material:	A1/SM 12
Number of Reference Pieces:	3 x 8 gentle process; 3 x 4 very gentle process
Preparation of Reference Pieces:	IEC 456, sections 5.6.1.1. and 5.6.4.2

Water:	softened water (hardness and pH to be measured)
Detergent:	2.0 g/l of C13 oxoalcohol 7EO (Lutensol A07/BASF)/ one in each bath
Measurement:	<ul style="list-style-type: none"> • IEC 456, section 5.6.5.1.3.5 (under water) • after each washing and drying cycle • eight washing and drying cycles <ul style="list-style-type: none"> gentle process—four pieces after washing and four after washing and drying very gentle process—four pieces after washing and drying
Aim:	shrinkage values set at (50 + 5) percent gentle and (25 + 2.5) percent very gentle
Calibration Procedure:	after five working cycles ISO 6330 program 7A in reference machine WASCATOR FOM 71
Deviation:	each deviation from test conditions must be registered

This second RRT is planned to be carried out in the fall of 1996 in order to gather enough data for the International Organization for Standards meeting in early 1998. EWCC wants to cooperate with the North American Institutes in the United States and Canada in order to get an international test method and labeling as soon as possible. EWCC welcomed North American delegates to the June meeting at Hohenstein this year and is looking forward to cooperation which benefits all parties.

1

EWCC **European Wet Cleaning Committee**

- **IDRC Research Institute**
France, Germany, The Netherlands, Sweden,
United Kingdom
- **CINET**
International Committee of Textile Care
- **DTB**
European Textile Manufacturers Council
- **Associated Members**
 - Machine/system manufacturers
 - Suppliers detergents, agents etc.
 - Technical and organizing contributions
attributing companies

2

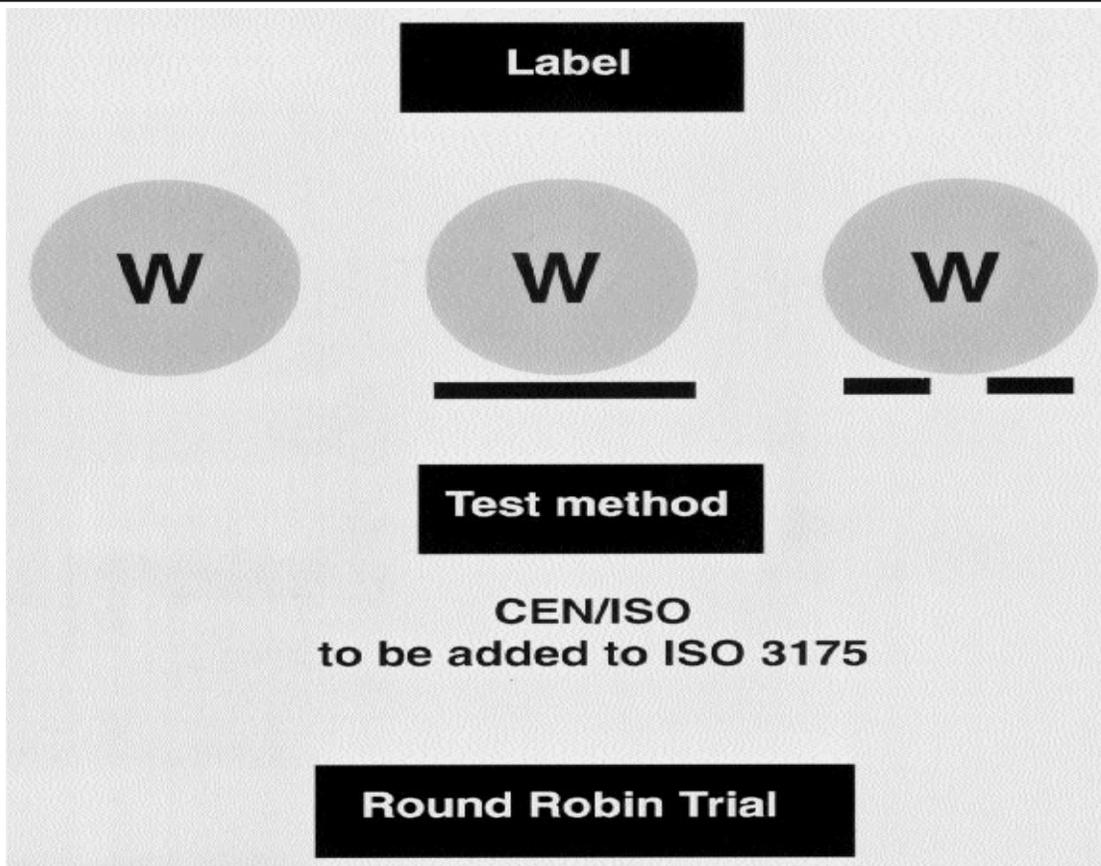
Aims of EWCC

- **To assist and support the cleaner to do a good job**
- **To develop test methods for wet cleaning**
cleaning efficiency, dimensional stability, colour
fastness
- **To propose a care label system for wet cleaning**

In general:

**Establishing the wet cleaning processes to an
adequate cleaning method in the field of dry
cleaning with no risks of textile damages for the
cleaner**

3



4

Round Robin Trial

- 11 Laboratories
FCRA, Hollenstein, IFP-TEPO, IR-TNO, WFK,
Electrolux, JLA, Miele, BuFA, Kreussler, Seitz
- 5 different types of machines
(different processes)
- Process parameters
washing times, temperatures, drying
temperature, drying time, liquid ratio, loading
ratio, detergent

Objective:

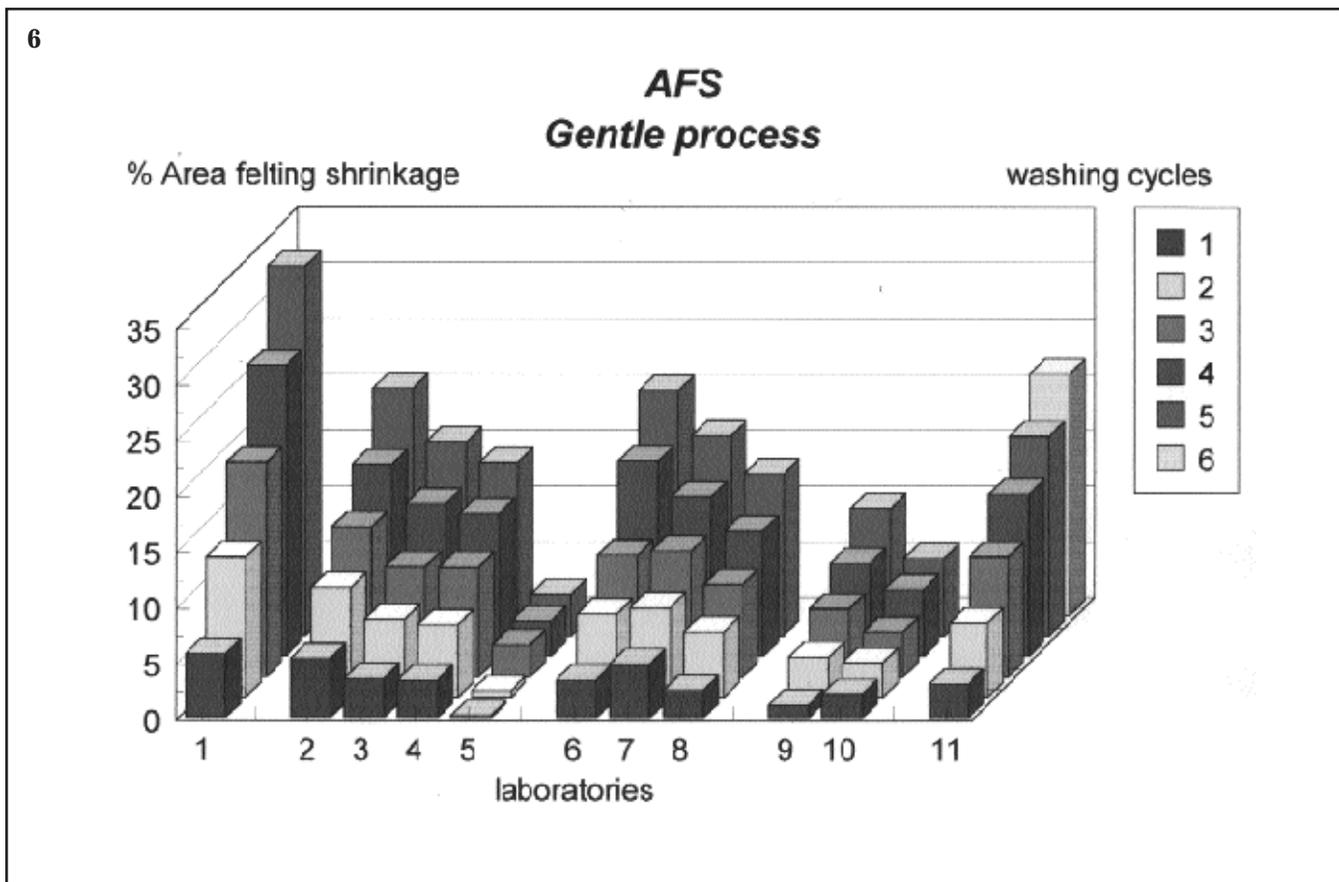
**Development of a test method for wet cleaning
to become a correlabel symbol for wet cleaning**

5

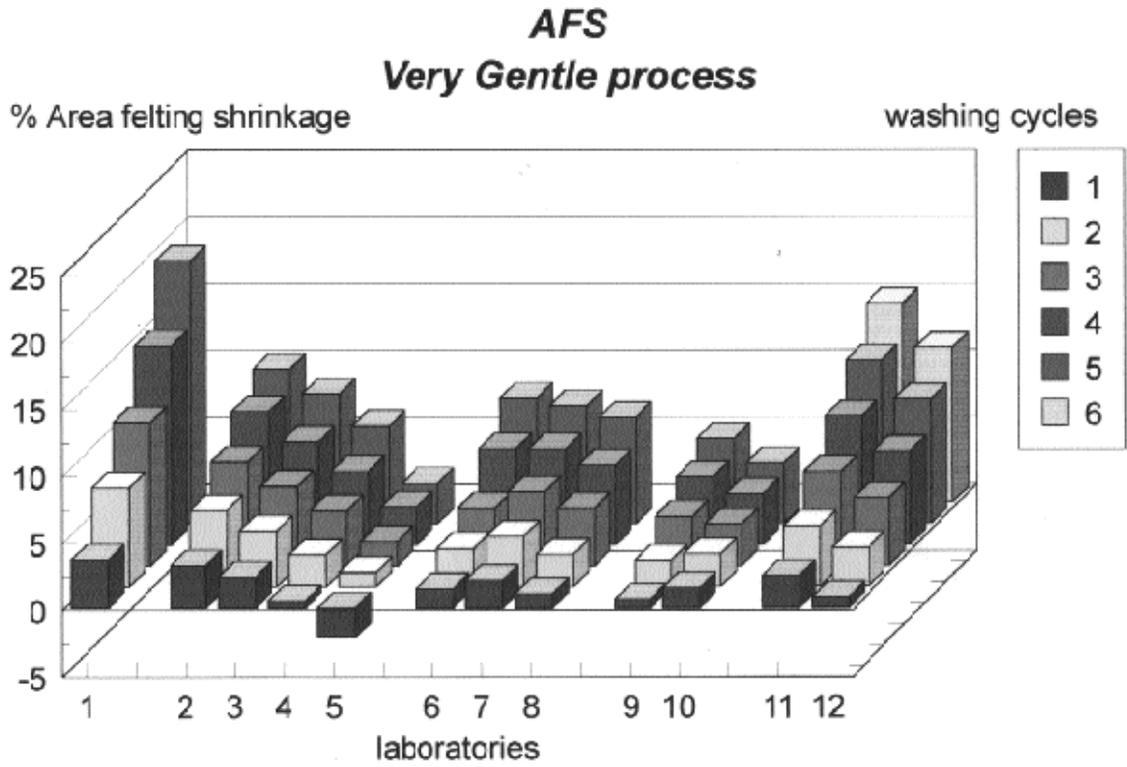
2 processes: Gentle Very Gentle

		Gentle	Very gentle
washing	pre-wash	30° C, 5 min.	-
	pump off		-
	main wash	30°C, 10 min.	30°C, 10 min.
	spin		
	rinse	cold, 5 min.	cold, 5 min.
	pump off		
	spin		
	drying	inlet temp.	60°C
drying time		to 12-15 % residual moisture	2 min.

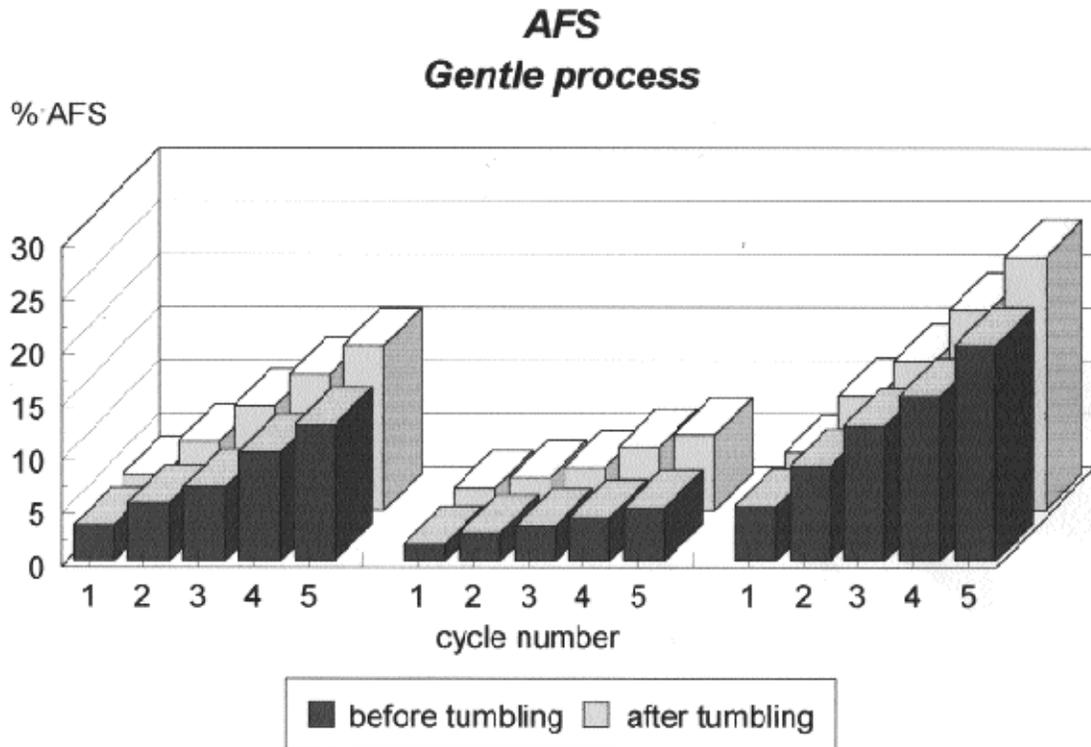
Liquid ratio 1 : 5
Loading ratio 1 : 25



7



8



9

Manual 2nd RRT

- **Composition of the ballast**
- **Reference material**
- **Number of reference pieces**
- **Preparation of reference pieces**
- **Processes**
- **Water**
- **Detergent**
- **Measurement**
- **Aim**
- **Calibration procedures**
- **Deviation**

Status of the European (International) Care Labeling

Helmut Kruessmann

GINETEX-wfk, Krefeld, Germany

Dr. Kruessmann is Scientific Director and General Manager of the Research Institute for Cleaning Technology. The Institute develops methods to reduce environmental impacts from dry cleaning processes and establishes performance testing methods for textile care. He also serves as Executive Vice President of the International Cleaning and Care Research Association, which coordinates research on dry cleaning. Dr. Kruessmann holds a Ph.D. in Textile Chemistry from Aachen Polytechnical University, Germany.

I was asked to tell a little bit about the status of European care labeling. The European GINETEX care labeling system has been accepted by a majority of the countries of the world as an international care labeling code. The care label itself was introduced in Europe about 1950. It originated in The Netherlands and then spread to France and the other European countries as a voluntary service to the consumers offered by the textile and apparel industry. It's not regulated by government. It's a voluntary service. To control the correct application, the care labeling code was protected by an international trademark. The ownership of this international trademark belongs GINETEX. GINETEX itself grants the ownership to the national bodies. The reason for this is to control its correct use. If you have no governmental regulation, then you have to have someone to control it. We thought it was best to have the industry and the consumer organizations do the controlling themselves. One big advantage is, if technology develops, it takes us just a few months to change our labeling system. We just need a meeting of the board to decide, we don't need any changes in governmental regulations or laws.

There were two discussion points for the basics of this care labeling system. One was optimum process, but when you discuss optimum care process, you need to discuss optimum to what. Optimum cleaning is always a problem for the lifetime of a textile, and sometimes this is a problem with environmental impact. GINETEX decided on a maximum process. Even with a maximum process, however, there are problems with material changes ranging from bleeding of color to irreversible damage to the textiles.

The next thing was it was produced by the textile chain. The textile and apparel manufacturer can and will, for cost reasons, only apply a very limited variety of care label combinations. The number of choices or

symbols, therefore, has to be reduced to the lowest possible level. Each symbol has to be based on a testing procedure in order to verify the correctness of the choice. The reason we could have a small number of symbols was that we omitted all the general information. For instance, you can give general information, such as if you have a loose structure, then you have to dry flat. Or if you have a colored fabric, it's better to dry in the shade, or turn it inside out during washing. So all this information is just given as general information to the consumer and not given as a label, as the information is true for almost everything.

Slide 3 shows the resulting care labels. The first is the washing symbol, which is a little bit different from the washing symbol in the United States. It's only a washing symbol for home laundry. This is advice to the consumer, not including the industrial launderer. The industrial launderer can use it as additional advice according to his own knowledge and experience as a professional for how to treat fabrics. Two additional symbols were also used. One is the bar under it for a gentle cycle, and the broken bar for a very gentle cycle, which actually is only used for the wool wash cycle. Then a hand-wash symbol. We have included at the moment five temperatures. It is still being discussed whether two temperatures should be deleted from the process, as only the remaining temperatures cause irreversible damage.

The second symbol on Slide 3 is a chlorine bleach symbol, as oxygen bleach was a general technique in Europe. The ironing symbol has three different possibilities. The dry cleaning symbol is also a little bit different from the American type. We only have one restriction, which is symbolized by a bar under the symbol. Our experience shows us that a dry cleaner has only two processes, one for regular work and one

for sensitive work. Actual restrictions are then water, mechanical action, and/or temperature in drying.

Finally, we have the tumble drying symbol. We think natural drying methods are well known to the consumer, and you can give information in the general form, for instance, dry flat or dry in the shade.

To summarize, we have a system on a voluntary basis and we have a system that is registered as a trademark. Now let's turn to alternatives techniques. Available alternative techniques are hydrocarbon solvents, wet cleaning and perhaps liquid or supercritical CO₂. For hydrocarbon solvents we normally do not have a big problem, as the hydrocarbon already is labeled with F. The only difference is with modern, explosion-proof machines and modern solvents. There might be some problems with the drying temperature and the drying time, as drying temperature is a little bit higher, approximately 60°C compared to the labeling of the mild process which has 40°C. This will be discussed by GINETEX in the future.

Now let's turn to wet cleaning, which was the major part of this discussion. We had no care labels for the wet cleaning process. The wet cleaning process was introduced in 1991. Even before the official introduction of this process, the discussion about introducing the wet cleaning symbols started in GINETEX. It is important when introducing a new care symbol that we have an internationally accepted care technique. That was not realized when the discussion started. When wet cleaning started in 1991, it was not internationally accepted. The second point is that we should have an internationally accepted test method. And the third point is the integration into the registered trademark. That is only true for GINETEX countries, but it raises some difficulties that we will discuss later on.

Three proposals for labeling of wet cleaning within the limitations of the trademark were discussed. One proposal is for the alternative use of dry and wet clean symbols, two symbols, allowing both possibilities. The second proposal was the application of a modified washtub as a symbol for wet clean. A problem with this is the consumers' trial-and-error practice which will lead to home laundry and perhaps to liability risks. And of course you can understand that the dry cleaning industry doesn't want this possibility, as it would promote home laundry. If professional cleaning is done according to the state-of-the-art, it is always more environmentally friendly than the home laundering process. So even from an environmental standpoint, labeling should not be going in this direction. This is especially true for the American type of washing machines which use quite more water and energy for washing than the European type of machines. The third proposal was for information in addition to the

registered trademark, either by words (but you have a language barrier in Europe), an additional symbol outside the care label, a combination of symbols and language, or a new extra symbolization.

These were the three possibilities discussed, and the decision was rather simple. The decision was to include it into the normal dry cleaning labeling. The reason for this was that the consumer should get the right information that he should bring this kind of article to the professional dry cleaner. If you create an extra symbol, you need extra information which would confuse the consumer. It has to go to the same shop but the cleaning method is identified by an additional symbol.

The wet clean classification would have three symbols. A normal W is used for washable articles, washable textiles or apparel, that, for performance reasons, should be professionally wet cleaned. This was what Kaspar Hasenclever mentioned, to invite the consumer to bring more articles to be professional wet cleaned. The second symbol is for gentle process. This was mentioned for "do not wash" articles according to the International Organization for Standards (ISO) 6330 test. The third one was a very gentle process for articles that also could not be washed according to ISO 6330, but have a higher sensitivity towards mechanical action as defined by the standards. Examples for the one bar process given here are normal wool articles. Examples for the very gentle process are angora, silks, and similar very sensitive articles.

We have one problem within our GINETEX system. This was very elegantly solved. Given that there are only two possibilities of registered symbol combination—they allow only one symbol for each treatment—what do you do when you have dry cleanable and wet cleanable articles? The decision made here was rather simple. As I already told you, the W was introduced to label wet cleaning. If an article can be either dry cleaned or wet cleaned, then the dry clean symbol has a priority. The reason for this is 95 or 90 percent of all dry cleaners still have perchloroethylene cleaning, and they should have the priority information. The W is put in a circle under the dry cleaning symbol outside the combination. If an article is not dry cleanable, then the W can be put in the normal combination.

We already discussed the test methods. As I said, if there are no accepted test methods, then there is no label. We need the accepted test methods, reasonable evidence for the correctness of the label chosen, and why an article is sensitive towards wet cleaning. Wet cleaning is the interaction of washing in detergents. These can already be tested by conventional methods, ISO 105 or ISO 6330. But there are a lot of articles that are sensitive because of the interaction of water, detergent, and mechanical action. The testing, therefore, has

been done under wet clean conditions. A novel testing procedure has been developed. Round robin tests are carried out. The momentary situation is that the test procedure or the demand for this test procedure has been brought in by the British Standard Organization to send to the European Standard Organization (CEN), which finances research programs. They proposed a new work item on wet cleaning testing in April 1996.

At the wfk a group has been developing a testing procedure for over a year. This proposal was accepted by the German Standard Organization and sent to CEN. CEN transferred this proposal to the ISO T3-38-SC2. We hope the proposal will be discussed by the professional cleaning group during the next meeting to be accepted as a new work item for ISO.

1

Helmut Kruessmann
wfk-Research Institute for Cleaning Technology
GINETEX Technical Commission

**STATUS OF THE EUROPEAN (International)
CARE LABELING**



Apparel Care and The Environment
Alternative Technologies and Labeling
Washington D.C., Sept. 9/10, 1998

2



**History of the Symposium/Ginetex
Care Labeling System**

- **Care Labeling was Introduced around 1950 as a Voluntary Service to the Consumers by the Textile and Apparel Industry**
- **To Control the Correct Application it was Protected by an International Trademark Registration in Geneva**

3



ISO 6330

WASHING

95, 60, [50], 40, [30] C

normal gentle very gentle



Hand Wash
30 C



ISO 105

CHLORINE BLEACH



cold and at low concentration



IRONING

200 C 150 C 110 C
Steam possible



ISO 3175

DRYCLEANING

[A]
P PERC, HCS Restrictions
F HCS Water/Mechanics
W WETCLEAN and/or Temp.



ISO 6330

TUMBLE DRYING

80-90 C < 60 C

4



Care Labeling and the Textile Chain

- The Textile and Apparel Manufacturer Can and Will for cost reasons only apply a very limited variety of care label combinations
- The number of choices [SYMBOLS] therefore has to be reduced to the lowest possible level
- Each symbol has to be based on a testing procedure in order to verify the correctness of the choice

5



Basics for Care-Labeling

- OPTIMUM Process

Environment

Convenience for the Consumer

Cleanliness

Lifetime of Textiles

- MAXIMUM Process

Material Changes ▣▣▣▶ all

 ▣▣▣▶ irreversible damage

6



Basics of ISO/GINETEX Care-Labeling

The Care-Treatment of

- Maximum Severity

a Textile/Garment Can Withstand without

- Irreversible Damage

7



“Available” Alternatives in “Dry”cleaning

- Hydrocarbon Solvents (HCS)

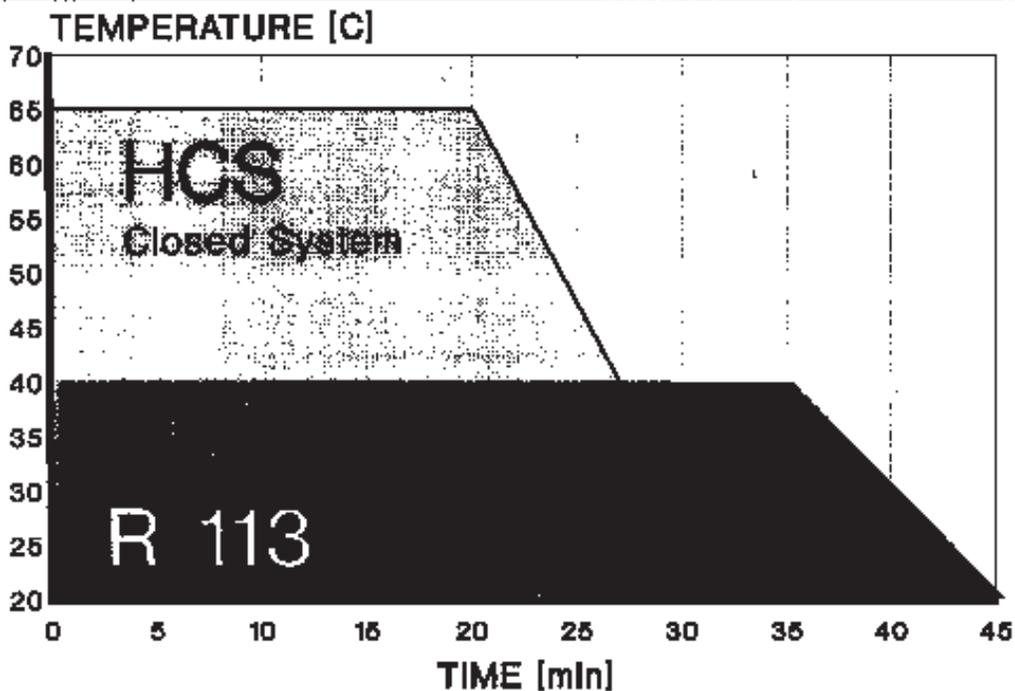
- WETCLEAN

- Liquid/Supercritical Carbon Dioxide

8



Time/Temperature-Diagram of F-Processes Applying R113 and HCS



9

BASICS

for the Introduction of a Care Symbol

- Internationally accepted technique
- Internationally accepted test method
- Integration into the Registered Trademark (GINETEX countries)

10

Proposals for a Labeling of WETCLEAN within the Limitations of the Trademark

1. Alternative Use of Dry- or Wetclean Symbol
What is with Wet- and Drycleanable Goods
2. Application of a Modified Wash Tub Symbol for Wetclean
Consumers' Trial-&-Error Practice will lead to Home Laundering; Liability Risks
3. Information Additional to the Registered Trademark
 - ▣▶ By Wordings (Language Problem)
 - ▣▶ Additional Symbol Outside Care Label Combination
 - ▣▶ Extra Symbolisation (Extra Trademark)

11



**Decisions of Ginetex Conseil (3/1996) with
Regard to Wetcleaning Symbolisation**

1. The circle with a W shall be introduced to label WETCLEAN with three severity levels
2. If an article can either be drycleaned or wetcleaned then the dryclean symbol has the priority in the registered combination. The W then shall be put in a circle under the drycleaning symbol outside the combination
3. If an article is not drycleanable, then the W may be used in the circle within the registered combination

12



**Classification of Textiles and Apparel
into the 3 Levels of Severity of Symbols**

1. normal 
Washable textiles and apparel which for performance reasons preferably should be professionally wetcleaned (e.g., complicated structures, finish)
2. gentle 
"DO-NOT-WASH"-articles according to ISO 6330 because of sensitivity towards mechanical action as defined by the standard (normal wools)
3. very gentle 
"DO-NOT-WASH"-articles according to ISO 6330 because of high sensitivity towards mechanical action as defined by the standard (angora, silk)

13

Another BASIC CONDITION

**NO ACCEPTED
TEST METHOD**

=

NO LABEL

Reasonable Evidence for the Correctness of the Label Chosen

14

WETCLEAN PROCEDURES

Procedure	normal	gentle	very gentle
W Wash Temperature [C]	40 - 95	30	20 - 30
A Load Factor [kg/L]	1:25	1:25	1:40
S Liquor Ratio [L/kg]	5	5	5
H Wash Time [min]	15	10	10
Mechanical Action	normal	gentle	very gentle
Rinses (No./Temp.)	2/cold	1/cold**	1/cold**
D Inlet-Temperature* [C]	80	60	60
R Endpoint Moisture [%]	8	12-15	
Y Drying Time [min]			2

* preheating to 80/40 C
** adding 2,5 g/L detergent

15

Maximum Shrinkage Requirements for the different sensitivity levels

<u>Process</u>	<u>Relative shrinkage [%]</u>
normal	no requirements
gentle	60
very gentle	20

The shrinkage of the A1 test monitors should not exceed the above relative values compared to the A7 wool wash program of ISO 6330.

The test procedure is described in IEC 456.

The figures are still in discussion

16

- **Calibration Process**

Calibration of the IWS A1 test monitor according to IEC 456 in the reference washing machine according to ISO 6330

- **Normalisation Process**

Validation of the gentle and very gentle process (washing and tumble drying) using the calibrated monitors

- **Wetcleaning Procedure (TEST)**

includes washing and pre-drying or drying according to the definitions of the test procedure for the care label and the finishing process as appropriate for the specimen tested

17



Status of the Situation for a Testing Procedure Concerning Wetcleanability of Textiles

- **Positive Vote by CEN on a BSI Paper Proposing a NWIP on Wetclean Testing Procedure [4/96]**
- **German Proposal for a Testing Procedure for Wetcleanable Articles Sent to CEN [5/96]
prepared by an International Working Group**
- **Transfer of the German Proposal to ISO TC38 SC2 as a Consequence of the Vienna Agreement [5/96]**

18

TRADEMARK PROBLEMS in Care Labeling

1. Care labels can only be used with the permission of GINETEX
2. GINETEX will only allow the use of the registered trademarks
3. There are only two registered symbol combinations. They allow only one symbol for each treatment.



19

wfk Permitted Symbol Combinations

1.

neither dry- nor wetcleaning
2.

only wetcleaning/no drycleaning
3.

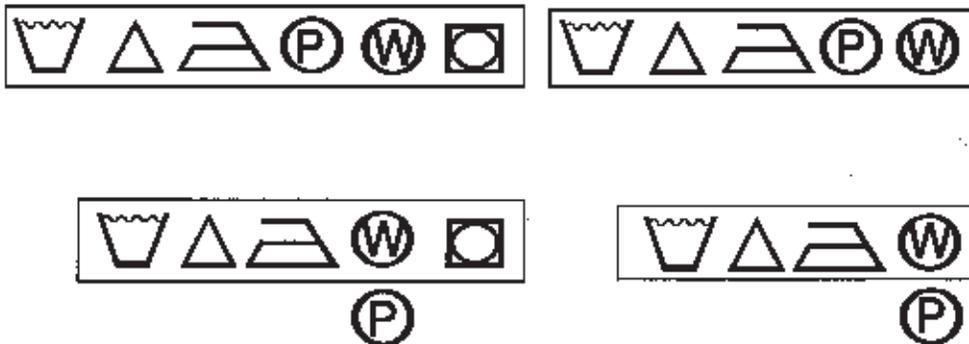
only drycleaning/no wetcleaning
4.

dry- and wetcleaning

20

wfk Not Permitted Symbol Combinations

dry- and wetcleaning



21

RESEARCH in the WETCLEAN Field

■ Pre-Research Work:

Defect Analysis and Fault Localisation after Wetclean
*WETCLEAN Technical Plant in Dresden/ wtk and Institute for Textile
 and Apparel Technology of the Technical University Dresden*

1. Production Requirements for Wetcleanable Apparel / Part I: Career Apparel

*Institute for Textile and Apparel Technology / Technical University Dresden
 Approved*

2. Improvement of Cleaning Performance by Process Optimization

*wtk and Partners (GRAFT, Phase 1)
 filed*

3. Optimization of Finishing Technology after Wetcleaning

*Institute for Textile and Apparel Technology Dresden / wtk
 filed*

22



"Dry"cleaning Symbols and the Technical Description of Processes

	PERC		HCS		WETCLEAN		
Washing							
temp./ C	33	33	33	33	30-90	30	20
time/min	20	10	20	10	15	10	10
load L/kg	20	30	20	30	25	25	40
Water Level	yes	no	yes	no	5	5	5
Drying							
temp./ C	60	40	60	40	80	60	60
moisture%					< 8	15	
time/min							2
Action	normal	gentle	normal	gentle	normal	gentle	very gentle

Results and Conclusions From Wet Cleaning Demonstration Projects

Jo Patton

Center for Neighborhood Technology

Ms. Patton is Coordinator of the Center for Neighborhood Technology's (CNT's) Sustainable Manufacturing and Recycling Program, which helps small businesses comply with environmental regulations through recycling and pollution prevention. In her current position at CNT, Ms. Patton serves as Project Manager for the Alternative Clothes Cleaning Demonstration Project, which she developed. Ms. Patton earned a B.A. in Latin American Studies from the University of Illinois-Chicago.

Introduction

In 1992, the U. S. Environmental Protection Agency (EPA) initiated a partnership with the dry cleaning industry and others to address ways to reduce exposure to perchloroethylene (perc), the solvent used by 90 percent of U.S. dry cleaners. This partnership provided a springboard for a variety of research projects on alternative technologies and substitute solvents.

One alternative identified early in this process was wet cleaning, a range of techniques and technologies that use water as the primary solvent to clean clothes labeled "dry clean only." Several of the research projects designed to evaluate wet cleaning are being conducted in real world commercial settings. This paper describes these research projects and summarizes some preliminary findings.

Center for Neighborhood Technology Research

The Center for Neighborhood Technology (CNT) is an independent, nonprofit research and technical assistance organization with a tradition of working with industry partners to find practical solutions to environmental problems. Through funding from EPA, CNT initiated the Alternative Clothes Cleaning Demonstration Project with the goal of evaluating the performance and commercial viability of wet cleaning. This CNT research project includes the design, monitoring, and evaluation of all aspects of a commercial clothes cleaning shop using only wet cleaning (called The Greener Cleaner) and data collection at two shops relying on both water and traditional dry cleaning solvents.

CNT designed The Greener Cleaner to mirror an average commercial dry cleaning operation in volume and rates as well as fabric, fiber, and garment types cleaned. The difference is that all items brought in for cleaning are wet cleaned. The shop has a wet cleaning system manufactured by Wascator in Sweden and distributed by Aqua Clean Systems, Inc. in the United States. The demonstration shop is privately owned and a lease agreement ensured CNT control of all testing and demonstration aspects of the shop's operation to carry out the research.

Evaluate the Performance of Wet Cleaning

The project gathered and compiled data regarding cleaning performance over time and with a full range of fabrics. Two test protocols were developed that address critical performance issues for tests on separate groups of garments.

The first test "Wet Cleaning: Performance on Full Range of Typically Dry Cleaned Garments" includes documentation of all garments cleaned at the shop, assessment of customer satisfaction, and intensive evaluations of a random sample of garments cleaned at The Greener Cleaner. During the course of the 12 months of research, the demonstration shop wet cleaned 31,734 items. Of those garments, 60 percent were of fabric types often labeled "dry clean only"—wool, silk, rayon, and linen.

To assess customer satisfaction, two telephone surveys of The Greener Cleaner's customers were performed by an independent survey firm. The first survey of 203 customers was conducted in November 1995, and the second, of 100 customers, was conducted

in June 1996. Results were consistent between the two surveys with 86 percent of customers rating the shop's overall service as "excellent" or "good" in the first survey and 87 percent responding positively in the second. Similarly, 85 percent of respondents in the first survey and 84 percent in the second said they would recommend The Greener Cleaner to a friend. Several questions were added to the second survey to gauge customers' knowledge of and attitude toward wet cleaning. The following question and responses indicate the extent to which environmental concerns played a part in customers' initial interest.

"Why did you first take your clothes to The Greener Cleaner?"

Concern about the environment	64 percent
Convenient location/parking	18 percent
Curious	16 percent
Other	14 percent
Reputation for quality service	11 percent

In another measurement of customer satisfaction, shop records on customers indicate a steadily increasing base of return customers. In September 1995, repeat customers represented 60 percent of total visits for the month. By April 1996, that figure was 81 percent.

The first test also included intensive evaluations by independent evaluators of a random sample of garments cleaned at The Greener Cleaner. Results of the intensive evaluations of 460 garments, conducted on the garments before and after cleaning, indicated that a majority of the garments were cleaned and finished satisfactorily. A central concern is the dimensional change noted in sample garments. Of the woven garments evaluated, 62 percent had shrinkage or stretching within the acceptable rate of 0-2 percent. Shrinkage or stretching in the range of 2-4 percent was measured in 27 percent of the woven garments, and 11 percent with over 4 percent shrinkage or stretching. Shrinkage and stretching in the knit garments was greater, with 21 percent measured with over 6 percent shrinkage and 15 percent with stretching over 6 percent.

The second test, "Comparative Analysis of Wet Cleaning and Dry Cleaning Performance After Repeated Cleanings," compares the performance of wet cleaning and dry cleaning on 52 sets of three identical garments. All the test garments specified dry cleaning in their care instructions and many were selected as likely "problem garments" for wet cleaning. In each set, one garment was wet cleaned, one dry cleaned and the third was stored and used as the control.

These garments were evaluated after being worn repeatedly and cleaned six times. In 13 sets, evaluators judged the general appearance of the dry cleaned gar-

ment to be better than the wet cleaned garment. In two sets, evaluators judged the general appearance of the wet cleaned garment to be better than the dry cleaned garment. On color change, evaluators rated seven wet cleaned garments and eight dry cleaned garments to have unacceptable color change.

As had been noted in the evaluations of customer clothes, dimensional change was far greater in knits than in woven garments for both wet and dry cleaned garments. A total of 16 dry cleaned woven garments and 15 wet cleaned woven garments had shrinkage within the acceptable 0-2 percent range. However, while there is little difference in shrinkage within this range, the difference in the upper ranges of shrinkage is significant. None of the dry cleaned woven garments had shrinkage of 6 percent or greater, while four of the wet cleaned garments did.

Monitoring Wet Cleaning Processes Under Field Conditions

Systematic observation of the shops has provided a basis for process evaluation including work flow, plant layout, water and energy use, and identifying process inefficiencies. In addition, several hundred cleaning professionals have taken advantage of the opportunity to tour the shop during business hours, watch the wet cleaning process from start to finish, and interview shop personnel.

Research on the volume and quality of water discharge from The Greener Cleaner was done in partnership with the Illinois Hazardous Waste Research and Information Center and the Metropolitan Water Reclamation District. Water testing was conducted for 3 days during which time volume was monitored and a composite sample was taken each day. Each sample underwent comprehensive lab analysis, with the following results:

- The pH of the wastewater was neutral.
- The biochemical demand was no higher than typical residential wastewater.
- The phosphorus concentration was approximately one-tenth that of typical residential wastewater.
- There were no significant concentrations of metals or toxic chemicals.

Experiences in Two "Mixed" Wet/Dry Shops

CNT is also conducting research at two other commercial sites. These are professional garment cleaning businesses in which a significant percentage of garments are wet cleaned and the remaining portions are cleaned off site in traditional dry cleaning solvents.

One of these sites is a small shop in Florida that uses two Kenmore washing machines manufactured by Sears in the United States for home use. The move to wet cleaning at Orange Blossom Garment Care was driven by necessity. When concern regarding the environmental impacts of the solvent Valclene prompted the phase out of this solvent, Orange Blossom owner Ruth Wedenburg decided to maximize her usage of her two washing machines rather than invest in new perc or petroleum equipment. During the research period, Orange Blossom wet cleaned 43 percent of total customer garments, laundered an additional 44 percent of shirts, and had the remaining 13 percent dry cleaned off site. Seventy-seven percent of the wet cleaned garments had care instructions specifying dry cleaning.

Located in Bettendorf, Iowa, Brix Cleaners was purchased by its current owner in January 1996. They use the Aquatex system developed by JLS with the washer/extractor manufactured in Belgium by IPSO and the dryer manufactured in the United States by American Dryer Corporation. This system is distributed in the United States and Mexico by Iowa Techniques, Inc. The new shop owner purchased the Aquatex with the goal of wet cleaning approximately 80 percent of their customers' garments by the end of 1996. During the research period in June the shop wet cleaned 43 percent of the total 1,846 garments cleaned.

University of California-Los Angeles

Pollution Prevention Education and Research Center

Last year, the University of California-Los Angeles (UCLA) through its Pollution Prevention Education and Research Center, initiated a wet cleaning research and demonstration project that parallels the Center for Neighborhood Technology project. It is focused on a private wet cleaning operation, Cleaner by Nature, which includes both a drop-off store, located in Santa Monica, California and a plant, located in Los Angeles. The business opened in February of this year.

UCLA is measuring performance at Cleaner by Nature using test protocols developed in cooperation with CNT. This will provide a broader data set upon

which to draw conclusions regarding many aspect of wet cleaning performance. In addition, UCLA will be comparing the environmental impacts such as chemical, energy, and water use, of a wet cleaning shop to a typical dry cleaning shop. UCLA has also developed a partnership with the Korean Youth Community Center which will help disseminate research findings within the Korean dry cleaning community, which is approximately 30 percent of the total industry. An interim report of research findings will be available this month, and the final report is scheduled for release in spring of 1997.

University of Massachusetts-Lowell

Toxics Use Reduction Institute

The Toxics Use Reduction Institute (TURI), located at the University of Massachusetts-Lowell, has been involved in the evaluation of wet cleaning for 4 years. It is developing a training program for the wet cleaning process that will include the development of a training manual. In addition, TURI is working closely with a professional garment cleaning business, Utopia Cleaners, that has recently replaced its dry cleaning machine with wet cleaning equipment. This shop is part of the recently-launched TURI Cleaner Technology Demonstration Sites Program. It will provide further research data on wet cleaning as well as an opportunity for dry cleaners and others to observe the operation.

Conclusion

Many have asked, "Is wet cleaning the answer?" The answer depends on the question. If the question is "is wet cleaning a 100 percent drop-in replacement for traditional dry cleaning solvents?" the answer is no. If the question is "can wet cleaning safely clean a significant percentage of clothes now considered 'dry clean only'?" the answer is yes.

While the CNT research has raised many new questions that will require further research, several conclusions can be made. A significant portion of garments now cleaned in traditional dry cleaning solvents can be safely wet cleaned. Given the variables that effect performance, however, it will be difficult to develop a simple guide, appropriate for use in commercial cleaning shops, indicating which garments can be easily wet cleaned. In both performance and commercial viability wet cleaning has demonstrated enough promise to warrant increased investment in research and development, accessible training programs, and a concerted effort to reshape U. S. care labeling rules.

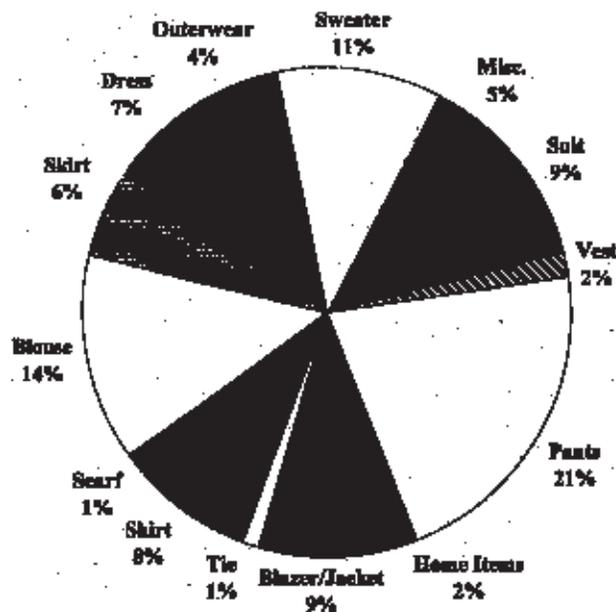
1

**Total Garments at the Greener Cleaner
(May 11, 1995 - May 11, 1996)**

	721	1688	2305	2560	2986	3277	2518	2711	2656	2660	2867	3410	1375	31734
	6	2	6	11	17	13	6	10	10	13	11	13	8	126
	216	316	477	576	721	995	906	896	866	822	950	1039	438	9218
	943	2006	2788	3147	3724	4285	3430	3617	3532	3495	3828	4462	1821	41878
	2	2	4	5	2	3	3	2	2	0	0	4	0	29

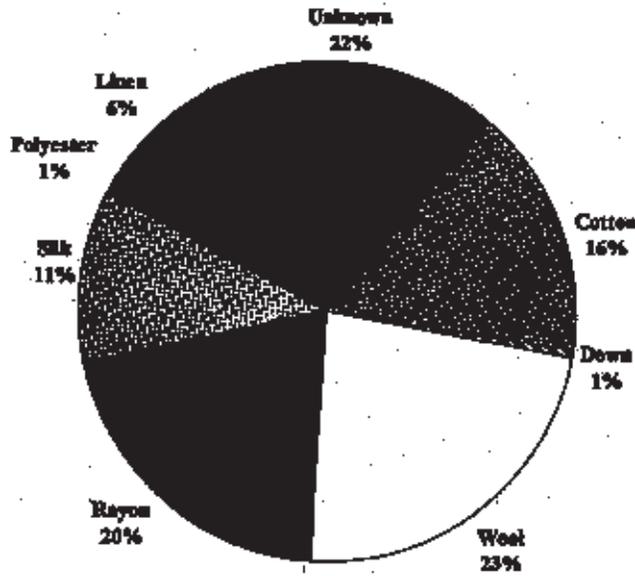
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**Garment Types of Wet Cleaned Items at The Greener Cleaner
(May 11, 1995 - May 11, 1996)**



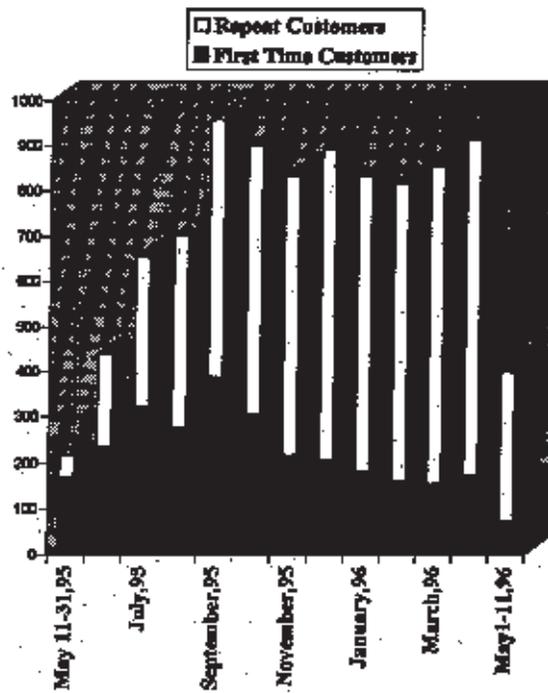
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**Fiber Types of Wet Cleaned Items at
The Greener Cleaner
(May 11, 1995 - May 11, 1996)**



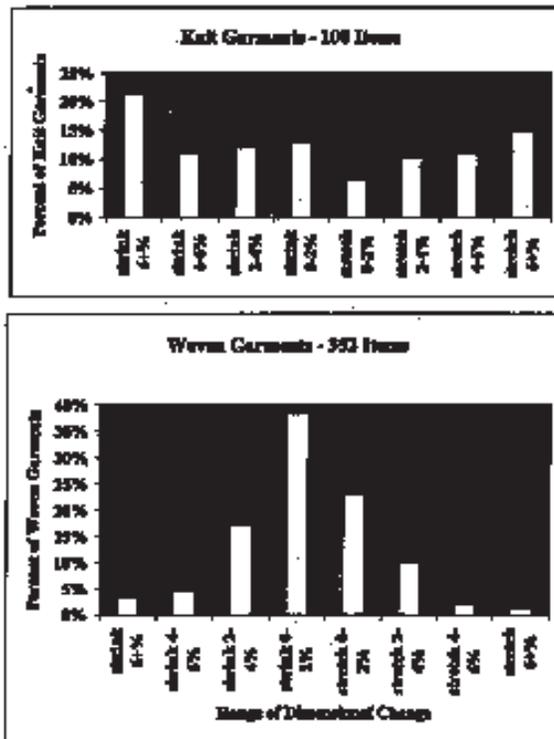
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Customers at The Greener Cleaner



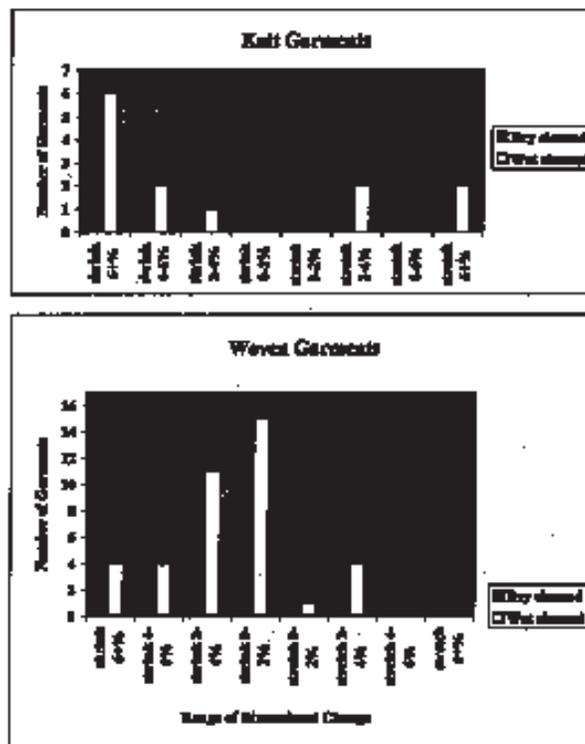
5

**Maximum Dimensional Change
for Test Sample Garments
(All Wet Cleaned - 460 Items)**



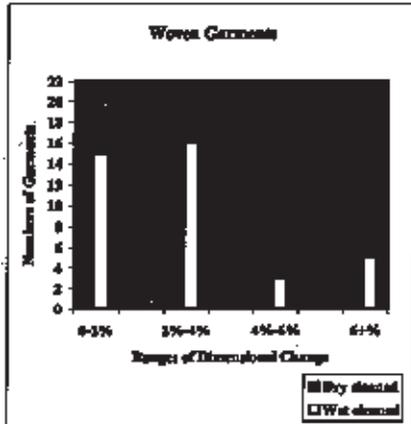
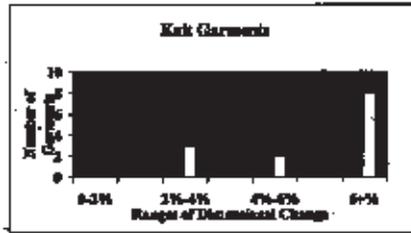
6

**Maximum Dimensional Change
for Identical Test Garments
(32 Sets)**



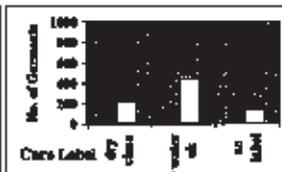
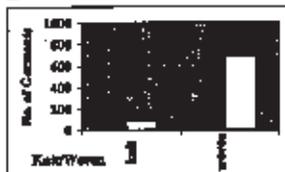
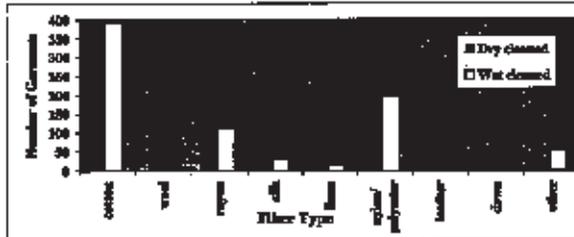
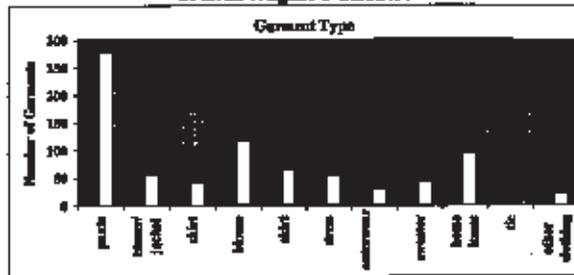
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Maximum Dimensional Change for Identical Test Garments



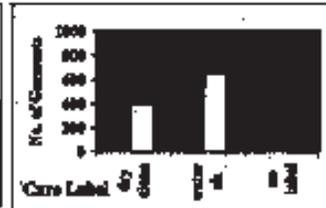
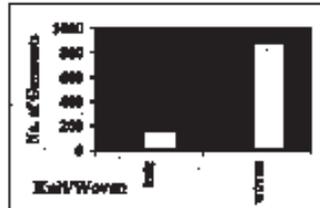
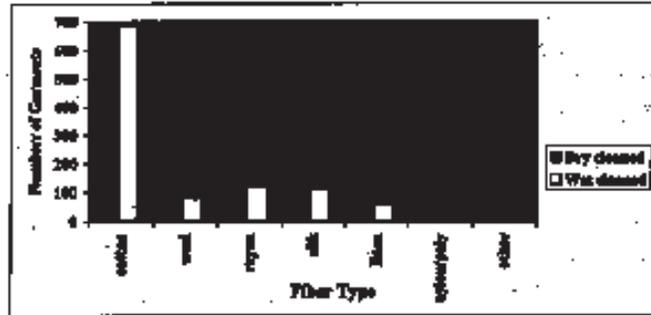
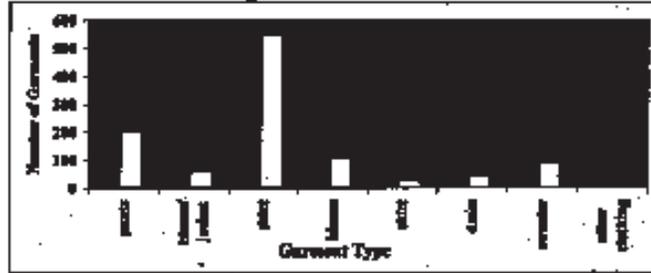
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Wet and Dry Cleaned Garments at Briz/Wagner's Cleaners



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**Wet and Dry Cleaned Garments
at Orange Blossom Garment Care**





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Summary of Discussion

Session II

Dr. Manfred Wentz of Fabricare Legislative and Regulatory Education Organization (FLARE)/American Association of Textile Chemists and Colorists (AATCC) opened the discussion and asked for questions about textile care technology development. He asked that specific questions about care labeling (with the exception of questions for Helmut Kruessman) be reserved for the following day's discussion.

Jack Weinberg of Greenpeace questioned Dr. Wentz's conclusion that aqueous and non-aqueous cleaning of garments will always be with us. He pointed out that aqueous systems are relatively new and there may also be changes in garment construction, in fabric manufacture, and in customer demand. Mr. Weinberg indicated that he didn't believe that the case has yet been made that non-aqueous systems are going to be with us forever.

Dr. Wentz replied that in the recent Canadian study he mentioned they pushed the envelope as far as they could on the basis of value judgments and experience and were able to wet clean 75 percent of the garments entering into that plant. Dr. Wentz continued, saying that unless social engineering is instituted, limiting consumer's choices by saying "you can't have this anymore," than indeed there has to be a co-existence between non-aqueous and aqueous cleaning. The reason for this is the properties of the textile and the dyes and construction of the garments.

Mr. Weinberg reiterated his points: (1) in terms of the study in Canada, it was built into the design of the study that non-aqueous cleaning would still be necessarily. It wasn't the conclusion of the study, but merely the value judgments that were brought to it. (2) The conclusions presented by Dr. Wentz are based more on the opinion of the presenter than on the academic material presented in the speech.

Dr. Wentz said he would throw the ball in Mr. Weinberg's court and challenge him to prove that you can wet clean everything. Dr. Wentz added that in terms of the common goal of reducing the impact of our action on the environment, he is convinced that we can do better and we are doing better.

Diane Weiser, President of Ecomat cleaners and laundromat franchise, asked the European speakers what the current status is in Europe of perchloroethylene (perc) and other solvents in terms of either being controlled or phased out or neither.

Dr. Josef Kurz, from Hohenstein Institute, Germany, replied that perc is very well controlled by the authorities, and the dry cleaners have invested a lot of money to comply with these regulations. Wet cleaning is improving and is a very good supplement for the non-aqueous treatment in the dry cleaning industry. Dr. Kurz said he is convinced that all the dry cleaners have accepted wet cleaning as a supplement to the solvent treatment, but sometimes they have not had enough courage to use wet cleaning because of the risk of damages.



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Summary of Discussion

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Ms. Weiser asked if in Germany they have cleaners in buildings where they also have residential tenants living.

Dr. Kurz replied that they do.

Jodie Siegel from the University of Massachusetts-Lowell Toxics Use Reduction Institute, had a question for Walther den Otter about the round robin trial test methods. She noted that the temperature used for the gentle and very gentle processes were 60°C and 40°C which translates to 140°F and 104°F respectively. Ms. Siegel asked why they are using such high temperatures. The experience that she has had in the United States with wet cleaning is that people are not using such high temperatures.

Walther den Otter said those temperatures were used for the drying part of the process, not the washing.

Ms. Siegel asked what washing temperatures they used.

Mr. den Otter replied 30°C.

Ms. Siegel remarked that that is still higher than what we use in the United States

Dr. Wentz said he thinks it's very common to have 30°C as a basis for washing sensitive items.

Bill Seitz of the Neighborhood Cleaners Association-International pointed out that 30°C converts into about 85-86°F, which is cool.

Ms. Siegel said that is considered a warm wash, not a cold wash.

Mr. Seitz replied that it's a cool wash, not a cold wash, and not a hot wash.

Connie Vecellio of the Federal Trade Commission (FTC) said the Care Labeling Rule defines 30°C as cold water.

Dr. Wentz added that the AATCC's test methods book has a whole outline of the definition of these temperatures. One of the problems is that with lower temperatures, certain fats and oils are very difficult to remove so from a cleaning perspective higher temperatures are better.

Helmut Kruessman of the Research Institute for Cleaning Technology, said that the International Wool Secretariat (IWS), which is really the expert on wool treatment, proposes an even higher temperature to get wool clean. 30°C is really a precaution. IWS proposes 40°C for wool.

Dr. Wentz said that research done some years ago demonstrated clearly that to get good cleaning, you need temperatures of 38-40°C.

Kaspar Hasenclever of Kreussler Chemical Manufacturing Company, added that shrinkage is not so strongly influenced with temperatures up to 40°C, but the bleeding of dye starts above 35°C.



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Summary of Discussion

Session II (Continued)

David Porter, President of Garment Care, Inc., wanted to thank Josef Kurz for the market data he provided. He remarked that he has not found comparable data for the United States. Mr. Porter asked if when Dr. Kurz said that he expected wet cleaning to increase by 90 percent is that because wet cleaning would allow them to do shirt laundering which is now done at home in Germany.

Dr. Wentz confirmed that shirt laundering in Germany is not done in dry cleaning plants at this time.

Mr. Seitz added that he thought Dr. Kurz, rather than talking about shirt laundering, was referring more to blankets, outerwear, and other articles currently done in the home that could be wet cleaned instead. He also noted that there is an old attitude in Germany about the importance of shirts being done at home. Many housewives are beginning to change that attitude, but it's a slow process.

Mr. Porter said that he was trying to point out that there is cultural difference between the potential U.S. market and the European market. He said his concern is there has been a decline in the market share of dry cleaning, which is very alarming.

Mr. Seitz noted that the dry cleaning share in the United States has been down the last 4 or 5 years and the reason has a lot to do with the economy. It's coincidental that the economy has been down for the last 4 or 5 years, both in the United States and in Germany.

Mr. Porter expressed concern about the cost of new equipment for dry cleaners. He asked what would prevent appliance manufacturers from making wet cleaning machines for the home? Mr. Porter said his goal is to increase business. In addition to having an environmentally acceptable process, we also make sure that we have an economically acceptable process which will not allow the continued decline of the professional garment care market.

Mr. Seitz responded that what we're attempting to do is point out that there are alternatives. Nothing prevents Whirlpool from making a home wet cleaning machine. It didn't prevent Whirlpool from making a coin dry cleaning machine 20 years ago. The question is, will it work in reality, and the dry cleaning machine didn't. A home wet cleaning machine may work, it may not. But nothing will stop Whirlpool from producing what they think is a marketable product.

Eric Frumin of Unite asked if, within the scheme of efforts that the European industries have underway, it is conceivable that an effort could be made to test the limits of machine wet cleaning or other wet cleaning methods beyond that which is being undertaken now. The Center for Neighborhood Technology (CNT) approach is to try to operate 100 percent wet cleaning, not to find a balance between wet cleaning and perc, or wet cleaning and non-aqueous solvents.

Mr. Hasenclever said that to ask that question is the wrong way of thinking because textile cleaning means serving customers. That has nothing to do



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Summary of Discussion

Session II (Continued)

with processes. Of course, the better process from environmental, ecological, and economic aspects will also be the better process for consumers. Mr. Hasenclever pointed out that 90 percent of apparel is cleaned in the home and that home laundering processes are not friendly to the environment because they use too much water and chemicals. Wetcleaning these articles would be better for the environment than home laundry.

Mr. Frumin asked if what Mr. Hasenclever meant was that rather than focusing on the balance of wet cleaning versus non-aqueous cleaning within the percentage of articles already brought to industry to clean, what Mr. Hasenclever is doing is trying to develop a wet cleaning method which can address the environmental concerns of all the laundering that is being done, including the 90 percent done in the home.

Mr. Hasenclever replied that he was.

Peter Sinsheimer with the University of California-Los Angeles (UCLA) evaluation team said that at UCLA they are doing a comprehensive evaluation of 100 percent wet cleaning both in terms of the performance and the economic viability. They're looking at the question of transitions between dry cleaning and wet cleaning and the extent to which both could work simultaneously through a transition period. At the California Fiber Care Institute, there was a dry cleaner who was cleaning garments using dry cleaning, but certain garments had water-based stains that he couldn't get out with dry cleaning. The dry cleaner would then wash those garments in a domestic washer on site which would clean the water-based stains, but the consequence was that the perc on those garments would go down the drain. This was a real problem. They actually were in violation of waste water treatment standards in California. This is a real problem for care labeling as well if we change to having a care label listing both wet clean and dry clean. Mr. Sinsheimer said he wondered how to deal with this problem of residual perc on a garment that could be wetcleaned and the environmental consequences.

Mr. Seitz replied by citing a problem that existed in the dry cleaning industry and how it got solved. A number of years ago, there were chemical companies who made stain removers for laundries and made specific chemicals for the removal of oil and grease stains. Many of those chemicals were perc-based. The way they solved that problem is they stopped making chemicals with perc bases for laundry. The dry cleaner who is dry cleaning a garment and while it is still damp, putting it in the washing machine, is in violation and the way to stop it is to dry the garments properly.

Dr. Wentz added that in the 70's and early 80's, there was a dual cleaning process proposed where this problem of residual perc was even worse. Sterling Laundry had a big project going on there funded by the U.S. Army. They had a group of people monitoring the effluents coming from a laundry and dry cleaning combination. What Mr. Seitz said is true. If you dry the garment properly, you will have very little residue coming out in the water. The question is whether the dry cleaner does dry the garment properly.

Charles Riggs pointed out that if you do the wet cleaning part of the job first, dry the garment, and then clean it in a solvent, you eliminate that problem.



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Summary of Discussion

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He also wanted to respond to Mr. Porter's concerns about the cleaning industry and what they're seeing in terms of the declining business. Dr. Riggs said that another reason why consumers are cleaning more at home than they're sending out is that they're not satisfied with the job that they're getting at the cleaners. To increase the market share, three factors need to be taken into account: convenience, cost comparison, and quality. Dr. Riggs said that he hears over and over from consumers that they don't like to take things to be cleaned because they come back and they're not pressed properly, or they smell bad. Dr. Riggs said that when he addresses a cleaners group, he always gets the question, "what should I do now, because we're here in a state of limbo," and his response is "whatever you're doing now, do it better." It's important to get that customer as an ally who supports your business regardless of what technology you're using, rather than someone who is looking for another alternative to running into your shop.

Paula Smith of the Indiana Department of Environmental Management asked Jo Patton if, with the water issue, they had tested for bubbling at the Publicly Owned Treatment Works (POTW).

Ms. Patton of the Center for Neighborhood Technology, responded that they did the sampling right at the discharge and on the basis of the sample, they gave feedback.

Ms. Smith asked if they had any contact been made with the POTW.

Ms. Patton replied that that's who did the sampling. The Metropolitan Water Reclamation District is the sanitary district for Chicago. They were our research partners in this.

Ms. Smith asked if they noticed increased bubbling at the plant when it got down stream. They tested right at the site, but did they test when it got down to the treatment plant.

Jo Patton said that by the time it got down to any treatment plant in Chicago we're talking about very large quantities.

Ms. Smith pointed out that, in other cities, that might be a problem.

Ms. Patton said that the testers had considered bubbling and in their judgment, based on what they saw in the sample, it was not a problem.

Jessica Goodheart of the UCLA Wet Cleaning Demonstration Project, asked what the timetable is for developing a new care labeling system? She also asked what the relationship is between the European community's development of care labeling and what goes on in the United States.

Dr. Wentz responded to the second question about what the United States is doing with respect to developing test procedures for care labeling in this regard. AATCC has a committee, RA43, which had a meeting on May 7. A resolution was passed to participate in the European round robin trials. They have also recently attended a meeting of the European Wet Cleaning Committee working group. Our efforts are definitely coordinating and our



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Summary of Discussion

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goal coincides with the European Wet Cleaning Committee's goal, which is to have some information available and take some action, if possible, in 1998 at the International Organization for Standards (ISO) meeting.

Ms. Villa of the American Textile Manufacturers Institute (ATMI), pointed out that in the United States, more than 500 technical standards for textiles have been developed and that there are textile test methods to assess color fastness to ozone, color fastness to water. She also asked Ms. Goodheart if she was she talking about wet cleaning standards or care symbol standards?

Ms. Goodheart remarked that she understands that a testing protocol for professional wet cleaning must be developed prior to implementing care labeling policies, but her question was when will the whole process be complete.

Connie Vecellio from FTC pointed out that the FTC process for amending the Care Labeling Rule has already begun. FTC has asked for comment on two federal notices already, and they will issue another notice beginning a rule making hopefully this year. Ms. Vecellio added that FTC will be very interested in the development of the necessary test for the wet cleaning process, as FTC is dependent for testing on AATCC or ASTM or the European organizations.

Mr. Weinberg had a question for Josef Kurz. One of Mr. Kurz's slides showed *supercritical* CO₂, but one of the U.S. speakers had talked about *subcritical*. Mr. Weinberg asked if the German experiment is with supercritical CO₂. His question was does Germany use the same kind of CO₂.

Mr. Kurz replied that it's the same.

Mr. Weinberg had a question for Helmut Kruessman about the way wet cleaning was listed on the GINETEX proposed care labels. Mr. Weinberg's concern is that for an increasing number of garments, both methods will be technically possible and what is the best way to signal that a garment should be professionally cleaned without specifying wet or dry.

Mr. Kruessman responded that the problem is really a trademark problem of GINETEX. GINETEX currently has a combination of home laundering, chlorine bleach, and ironing symbols, with only one symbol for professional cleaning. For this reason, they needed to have some regulations if an article can be wetcleaned and drycleaned. The market will regulate and the consumers will regulate. GINETEX decided there are some possibilities. For example, if an article can only be wetcleaned, then the wet clean symbol can be included in this row of four or five symbols. If an article can only be drycleaned, then there is no problem. If the article can be wetcleaned or drycleaned, GINETEX decided that you cannot put both circles on the same row. It was decided then the wet clean symbol should be put under the symbol row. It's purely a question of trademarks. It's not permitted to put the dry cleaning and wet cleaning symbols in one row. That's just a decision for the moment.



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Summary of Discussion

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Mr. Weinberg asked if there would be a copyright problem if a third symbol were used that meant both wet cleaning and dry cleaning.

Mr. Kruessman responded that this issue was discussed, but the problem is some articles may be considered sensitive in wet cleaning which are not considered sensitive in dry cleaning. That would make it difficult to determine whether or not to put a bar [meaning sensitive] under the symbol. GINETEX decided two symbols was the easiest way to give the information to the dry cleaners.

Ms. Villa wanted to inform everyone about the U. S. position with regard to GINETEX. This method was promulgated in ISO in 1991 and it passed by a 75 percent majority, but there were five major western nations that voted against the standard including South Africa, Japan, Australia, Canada, and the United States. The United States has not accepted or recognized the GINETEX system, and one of the technical hang-ups with the particular standard itself was the instructions that were given to the consumer about the order. The United States also would not accept the standard because of the trademark issue.

Mr. Frumin noted the broad nature of the participation at the conference from many different sectors. He said he was curious to hear from the academics and industry participants which industry or industries, in the chain, from fiber to textile to apparel to retail, bear the greatest burden for the current changes.

Carl Priestland of American Apparel Manufacturers Association (AAMA) noted that the apparel industry in the United States produces something like \$50 billion worth of apparel domestically and that means about 6.5 billion garments that have to have labels on them. So the biggest problem that the apparel industry faces is to make sure that what we put on those labels actually works. We have to get the information from the textile industry, and we have to give it to the consumer. The real problem is that apparel manufacturers are not the first ones to get this apparel back. It's the retailers and the dry cleaners. But the apparel manufacturers are the ones that have the biggest responsibility for care labeling changes.

Ms. Siegel asked Josef Kurz about his slides showing the rayon and wool swatches with different finishes on them. She asked if any research was being done about adding these protective finishes to the wet cleaning process such as in the detergent used.

Mr. Kurz replied that anti-felting finishes on wool and anti-shrinkage finishes on rayon are state of the art. But these finishes can't be added to the detergents.

Mr. Seitz commented that cleaners have a number of problems with the finishes that manufacturers currently use.

Mr. Wentz concluded the discussion by thanking all the speakers for excellent presentations. He said the message he would like to give all participants is: we are breaking the paradigm that dry cleaning means dry cleaning



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in perc. However, based on what we learned this afternoon, what we probably will also learn also tomorrow, and based on his own experience with AATCC and ASTM it's clear that it is a complex issue. There is no easy answer; however, if every one of us continues to participate in the process, we will hopefully reach our goals of environmentally responsible textile care and meeting the needs of the consumers. We are trying to influence them by giving them choices, but in the final analysis, the market place will make the final decision.



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Session III

FTC Care Labeling Revisions

Connie Vecellio

Federal Trade Commission

Ms. Vecellio is an attorney in the Division of Enforcement of the Bureau of Consumer Protection at the Federal Trade Commission. For the last several years, her responsibilities have included enforcing the Commission's Care Labeling Rule, which requires care labels on textile wearing apparel. Ms. Vecellio has a J.D. from Harvard Law School and a B.A. cum laude in Economics from University of North Carolina-Chapel Hill.

I'm an attorney at the Federal Trade Commission, and one of the main things I do is enforce the Care Labeling Rule. Also, in recent years, thanks to those of you in this room, I also work on the amendment of the Care Labeling Rule.

I want to tell you a little about the history of the rule, why it was promulgated, when it was promulgated, and when it was amended. I'd like to tell you what it does and does not do. Then, I'm going to tell you a little about the history of the current revisions we're working on, and the kind of information that's relevant to those current revisions. These revisions include revising the rule to allow for labeling for professional wet cleaning; and possibly revising the rule to require that any garment that can be laundered at home be so labeled. Also, revising the rule to allow the use of symbols in lieu of words.

The rule was promulgated in 1971 by the Federal Trade Commission. The Federal Trade Commission is composed of five commissioners appointed by the President. I am required to tell you that the opinions I express today are my own, and do not necessarily represent the view of the Commission or of any individual commissioner, although I hope they do. Our basic statutory authority is to prevent unfair deceptive acts or practices in commerce. In 1971, the Commission promulgated the Care Labeling Rule, saying that it was unfair and deceptive to fail to include care instructions on garments. The Commission has said that the rule is intended "to assist consumers in making informed purchase decisions, and to enable consumers and cleaners to avoid product damage." The rule only requires that one method of cleaning be given. That method can be either washing or dry cleaning. The rule does not require that directions for both be given on a label, even if a garment could be cleaned in both ways. In 1983, the Commission amended the rule to be more

specific as to what must be included in a care instruction either for dry cleaning or for washing.

The Commission defined dry cleaning in 1983. Prior to that time, there was no definition for dry cleaning. That caused a number of problems. The rule currently defines dry cleaning in the following way:

"a commercial process by which soil is removed from products or specimens in a machine which uses any common organic solvent (for example, petroleum, perchloroethylene [perc], fluorocarbon)."

I guess that's already a little out of date because fluorocarbon is only available now to those who stockpiled it. The dry cleaning process may include moisture addition to solvent up to 75 percent relative humidity, hot tumble drying up to 160°F, and restoration by steam press or steam air finishing. The rule was also modified in 1983 to require a warning if any part of the normal dry cleaning process as defined in the rule would harm the product. For example, if a special instruction is given for professional dry cleaning, that means that dry cleaners should use the process above but modify it. One example given in the rule is if steam should not be used. The label should state "Professionally dry clean; no steam." Other warnings are "short cycle," "low heat," and "low moisture."

The other requirement that was added in 1983 is that a manufacturer must have a reasonable basis for the care instructions it puts on a garment. One example of a reasonable basis would be positive test results showing that the garment can be dry cleaned. However, there are other bases such as reliance on technical literature, past experience, and industry expertise. So, the rule currently requires one adequate method of cleaning with warnings against any part of the normal process that cannot be used and it requires that the manufacturer have a reasonable basis for that care instruction including any warnings.

I want to talk a little about what the rule does *not* do. It does not govern liability for consumer claims. The fact that a label recommends dry cleaning does not insulate the dry cleaner from liability. Liability with respect to consumer claims, depends on the laws of the states. And in many states, I've been told, the dry cleaner is basically held liable on a theory of bailment—he took the product, he's a professional, he's liable if something goes wrong. The rule does not insulate him against that liability. I want to make a point of that because the same is going to be true if we allow an instruction for professional wet cleaning. That will not insulate cleaners against liability. It's also true that the rule does not require the dry cleaner to do what's on the label. He is not breaking the law if he chooses to do something else. So, the rule is not going to solve all problems that might be encountered with professionally wet cleaning.

Let me go over what we would need to include professional wet cleaning in the rule. We would need the same elements that I just went through for dry cleaning. We would need a standardized definition of professional wet cleaning, similar to what we have for dry cleaning, so that warnings could be given if certain parts of the wet cleaning process would damage the garment. And we would also need a way of determining whether a manufacturer had a reasonable basis for placing a claim on the care label that the garment could be professionally wet cleaned. That's where the importance of the development of the test method comes in. Tests are not the only way of having a reasonable basis, but for a very new technique like this, they certainly would be more important than they are for more established techniques that have been around for decades.

The third important element is that wet cleaning would have to be available to most consumers. We need information about how available it is before we can allow garments to be labeled simply professionally wet clean. If there's no professional wet cleaner in an entire state, it's not really fair to the consumers in that state to put garments on the market labeled "only for professional wet cleaning." However, I gather wet cleaning is growing very quickly. Someone said yesterday that there are at least 80 in the North American Continent, but I hope there are more. Someone from Indiana said she thought there were 100 in Indiana alone. So hopefully, it's growing by leaps and bounds and the availability problem will be solved. But we need information on all those points; a standardized definition, what would be a reasonable basis for such a care label claim, and the availability of the service.

Let me tell you what's being done currently and what we've already done to start revising the rule, with

respect to professional wet cleaning and also with respect to home laundering. In June of 1994, we issued a Federal Register (FR) notice asking for comment on a variety of subjects about the rule. The comments we got generally expressed satisfaction with the rule. It's one of our most popular rules, so we're definitely going to keep it. We also noted that garments that are labeled "dry clean" may also be washable, but consumers and cleaners have no way of determining that from the label. We asked for comment on whether a garment that could be either washed or dry cleaned should be labeled for both washing and dry cleaning. We asked about the costs and benefits, including environmental benefits, of such an amendment. Now, in analyzing those comments, the Commission actually announced in a second FR notice in December 1995, that amendment of the rule might be necessary, and it issued what's called an advance notice of proposed rule making, asking for comment on more specific proposals.

Based on the comments we got to the 1994 FR notice, the Commission indicated it was not proposing dual disclosure; that is, that both washing and dry cleaning appear on the label of a garment which can be both washed and dry cleaned. Several commentors had noted that dual disclosure would require a dry cleaning label on all washable garments such as tee shirts, which generally are not dry cleaned. According to these commentors, this would require manufacturers who do not currently test for dry cleaning because they don't make anything that they label for dry cleaning, to begin testing for dry cleaning. That would be counterproductive as it would increase the use of perc. Other comments indicated that consumers would not want to spend money to dry clean garments that are washable. So for those reasons, the Commission indicated in the 1995 FR notice, that it was not proposing dual disclosure but, rather, proposing that for a garment that can be home laundered, it be so labeled. Dry cleaning instructions could also be added, if the manufacturer wanted to have both, but that would not be required. That's the current proposal that the Commission requested comment on in 1995.

In the 1995 FR notice, we also specifically sought comment on professional wet cleaning. We asked for a very specific description of the process. We got good comments providing that description, but I gather that's all still in a state of flux and we'll probably get more specific comments on our next round.

We also asked how many businesses provide this service. We're going to be asking that again on our next round, because this is a very important element that will go into whether we can change the rule to either

require or allow for profession wet cleaning instructions.

We also asked whether fiber identification should be on a permanent label. Some of the wet cleaning companies commented that they needed fiber identification and that it's not always available because it can be listed only on a label that can be cut off. We're exploring whether we should require that to be on a permanent label. Industry people have told me that most people in this country, at least, already put it on a permanent label. We are also proceeding on another front to allow all this information to be conveyed in symbols. Jo Ann Pullen will tell you what's available on that.

The next step in our rulemaking will be the publication of a more specific proposal and notice of proposed

rulemaking for comment. Then we will analyze those comments and determine whether we need to have hearings to complete the rulemaking process. That depends on how controversial all these things are and whether people want hearings. The 1983 amendments were quite controversial and hearings were held at several different cities around the country and the process took quite a long time. The rulemaking process can take a long time or it can be done quickly, depending on how controversial it is.

I want to finish by asking all of you to please comment when we do issue our next FR notice. Somebody yesterday said that most of the answers to all these problems are in the heads of the people here in this room. I certainly hope you'll comment and give us the benefit of that information.

FTC 16 CFR 423
Glossary of Standard Terms

Dryclean:

a process by which soil may be removed from products or specimens in a machine which uses any common organic solvent (for example, petroleum, perchlorethylene, fluorocarbon) located in any commercial establishment. The process may include moisture addition to solvent up to 75% relative humidity, hot tumble drying up to 160°F (71°C) and restoration by steam press or steam-air finishing.

Professionally dryclean:

use the drycleaning process but modified to ensure optimum results either by a drycleaning attendant or through the use of a drycleaning machine which permits such modifications or both. Such modifications or special warnings must be included in the care instruction.

**ASTM D5489 symbols report
drycleaning per FTC Trade Regulation
Rule 16 CFR 423 on Care Labeling**

General:

- "If a drycleaning instruction is included on the label, it must also state at least one type of solvent that may be used."
- "If all commercially available types of solvent can be used, the label need not mention any types of solvent."

Warnings:

- "If there is any part of the drycleaning procedure which consumers or drycleaners can reasonably be expected to use that would harm the product or others being cleaned with it, the label must contain a warning to this effect. The warning must use the words 'Do not,' 'No,' 'Only,' or some other clear wording."
- "If a product can be drycleaned in all solvents but steam should not be used, its label should state 'Professionally dryclean. No steam.'"

Status Report From ASTM's Care Labeling Committee

Jo Ann Pullen

American Society for Testing and Materials

Ms. Pullen is the K-12 Health Coordinator, Department Head, and Teacher of Family, Consumer, and Health Sciences at Pioneer Valley Regional School in Northfield, Massachusetts. She has been an active consumer member of the American Society for Testing and Materials Committee D13 on Textiles for 19 years. Ms. Pullen is a doctoral student in Occupational Education at the University of Massachusetts, holds an M.S. in Textiles and Clothing from Cornell University, and earned a B.S. in Family and Consumer Sciences Education from Pennsylvania State University.

First, I'm going to give you a little background about the American Society for Testing and Materials (ASTM). ASTM's Committee D13 on textiles is 82 years old, and I'm the first woman chairman of the Subcommittee of Care Labeling. We also have committees for writing various standards. The D13 committees include producers, users, government, academia, and consumers. We write consensus standards, which are approved by ballot. If the draft of a standard receives a negative vote, it has to be in writing, it has to be technical or editorial, and we have to resolve that negative in writing before we can proceed with revisions. We have been through many ballots. Committee D13 has over 325 standards in their handbook. We work together with the American Association of Textile Chemists and Colorists, which also writes standards, so that we're harmonized in that sense. Our standards are backed by research, member expertise, and confirmation testing, if it is something that needs a round robin trial to prove that it works.

Our goals are to promote knowledge of textiles and develop consensus standards for textiles and related material. We have four standards. We have one that is the care symbols. We have another that is evaluating care information, which is simply a guide that tells the manufacturer to set some criteria and then to test it and write their report. We also have a standard definition of terms for apparel, and we have one for pile floor coverings.

The care symbols system is based on a simple pattern: three dots is hot or high, two dots is warm or medium, and one dot is cool or cold, or low setting. So in the washing, there's high, medium, and low for temperatures. If it is the washing machine, the tumble

dryer, or the iron, three dots is always hot or high, two dots is warm or medium, and one dot is cool or cold.

On the cycles for the appliances, a plain symbol is the normal cycle, one underline or minus sign is permanent press (meaning reduce the action), and two minus signs mean delicate or gentle. We also have a symbol for hand wash. In the United States we specify temperature. In Canada, I think their standard is 30°C, and in Europe it's 40°C, so that is one point for harmonization. In addition, there is a symbol for machine wash warm, or the permanent press cycle.

Regarding bleaching, ASTM was working with the Federal Trade Commission rule. We took the glossary of terms and decided to work on a symbol for each term, to make us harmonize the best we can. We took all the International Organization for Standards (ISO) comments on that draft and standards that weren't met in the ISO standard, then we invited Canada and several other countries—Japan, Australia, and Mexico—to work with us. We had 15 countries in ASTM's D13 committee at the time we developed this. We have a symbol for only non-chlorine bleach (which is very commonly used in the United States), any "bleach," and "do not bleach." The reason for the solid "do not bleach" symbol is that the regular triangle with an "X" in it means "do not chlorine bleach." In the United States, you need to have an instruction, not a warning for bleach; you say "only non-chlorine bleach" when needed.

The drying symbols are the same as Canada's and Mexico's. The European or ISO system has no natural drying symbols, and they do not have a non-chlorine bleach symbol, so the European or ISO system partially meets U.S. needs. The ASTM system has symbols for

tumble dry, normal, permanent press, delicate, three temperatures, no heat, and do not tumble dry. For ironing, we have high, medium, low setting and an additional symbol to warn “no steam.”

Now we get into what you're interested in: dry cleaning. Currently, ASTM adopts the ISO terminology for solvents. For example, there is a symbol that stands for any solvent (which is used mainly for perchloroethylene [perc]). The beauty of the ASTM system is that as we are reaching out more and as people are becoming more interested, it simply takes a draft we all agree on, and then we revise the standard. We do not have to wait 5 years. If technology changes and a new, more environmentally friendly dry cleaning solvent is found, the entire industry and government agree on a symbol through ASTM, we ballot it, and it's added to the standard.

The reason that the single underline (used in Europe, meaning short cycle and/or reduce moisture, and/or low heat, and/or no steam finishing) was separated is because ASTM is not allowed to put out one symbol that means four things. In that situation, the person who is reading the symbol has to make the decision which of those four things it means. At ASTM, we're proud of the fact that our standards are technically clear. One underline that means four different instructions is not technically clear, so it goes against the way ASTM is allowed to do business. In the standard, you may use a symbol and then spell out what that means. If you want to say low heat or reduced moisture, you don't have to use that symbol. You may use symbols and words together. So it will work for a Canadian system where they have the dry clean circle and they use words. The difficulty in North America is you need words in three languages.

In speaking with Helmut Kruessman who is chairman of the GINETEX Technical Committee, he says that P is commonly used to indicate “professional dry cleaning.” I have also learned that GINETEX proposed a W for wet clean and Japan proposed a W for “white spirit” if F was not acceptable as a clear instruction. So you see we're ready to discuss this and figure out what works and revise the standard if we need to for dry cleaning. But we need some symbols to identify the solvent, perc and/or petroleums or petroleum only, and as wet cleaning becomes more common, we'll need a symbol for that as well. We had originally begun with a symbol with WC in it for professional wet cleaning to alert people that this is a different process than dry cleaning. Now Europe is considering redefining the circle as professional cleaning. Then we could use the WC or W, but come to an agreement on what the letters would be for wet clean, petroleum, and perc.

The good news is we're all here together working on this, and the better news is that when we decide it, we'll all do it together. It takes about 3 months to get through the balloting process. I am so glad that we're internationally discussing these situations and will come to agreement. As you can see, in two days my overheads are out of date, because I've talked to more people and it looks good.

When I go to a classroom, I use a chart that has a lot of lines on it and a chart with no lines breaking things up, and have children decode four symbols. Then I ask them to do some meta-cognition, thinking about the thinking. Which chart were you most comfortable with? The random thinker, or the creative thinker, likes the chart with no constrictions. The organized, sequential thinker likes the chart with the lines. So I thought I'd educate you about that, that when it comes to consumer education, you've got two different frames out

Committee D-13 on Textiles

- Promotes knowledge of textiles
- Develops consensus standards for textiles and related materials

DEVELOPS STANDARDS FOR:

Fibers

Yarns and Cords

Fabrics and Fabric Systems

Physical Testing

Flammability

Home Decorating Products

Apparel Products

Notions

Sizing

Care Labeling

Nonwovens

Inflatable Restraints

Committee D-13 on Textiles

Working together

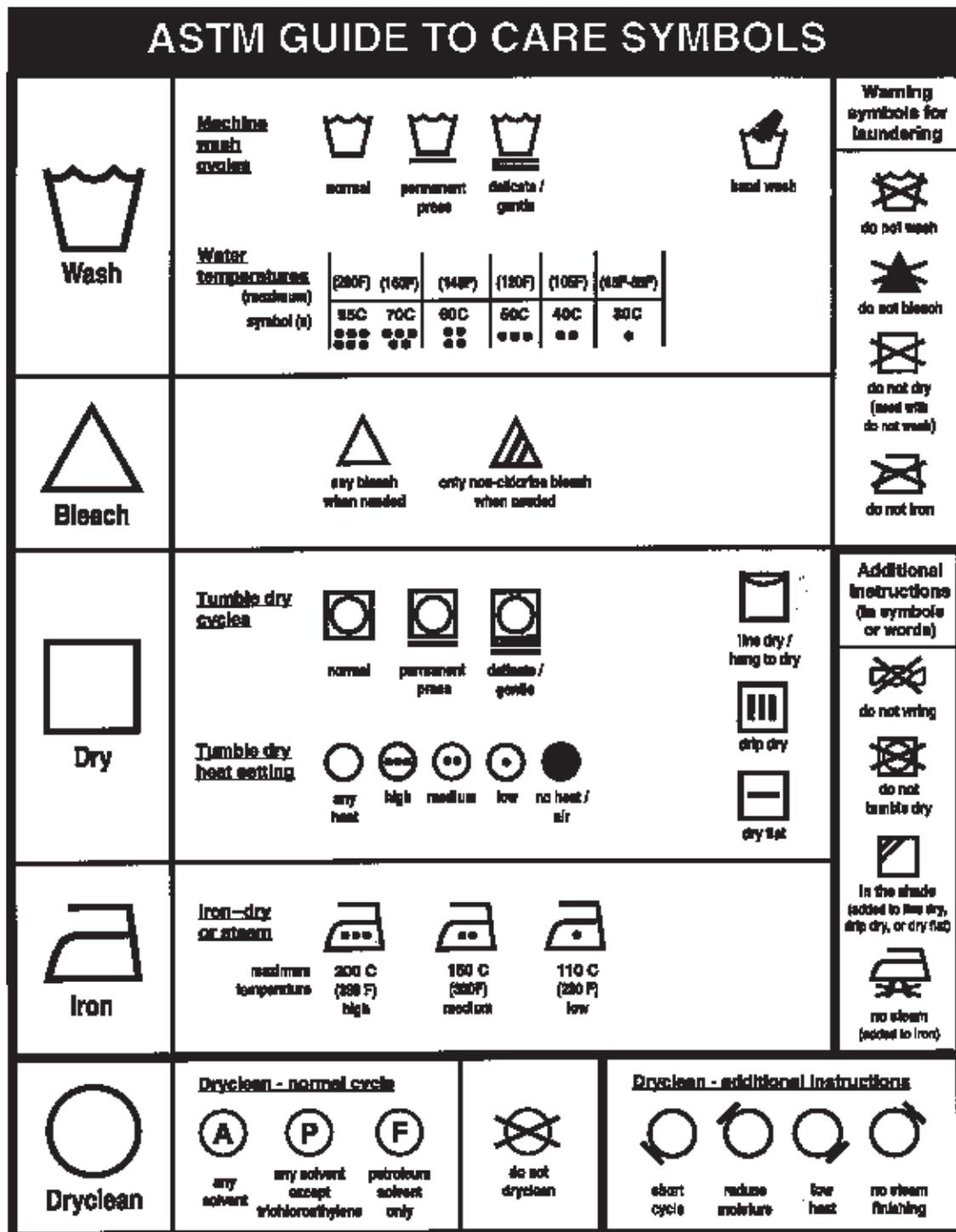
- **Producers**
- **Users**
- **General Interests**
- **Consumers**

Writing consensus standards

COMMITTEE D-13 ON TEXTILES

Over 325 Standards

**Standards development
backed by
research,
member expertise,
and
confirmation testing.**



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Note: This figure illustrates the symbols used for laundering and drycleaning instructions. As a minimum, laundering instructions include, in order, four symbols: washing, bleaching, drying, and ironing; and, drycleaning instructions include one symbol. Additional symbols or words may be used to clarify the instructions.

ASTM D5489-96b FIG. 1 Commercial and Home Laundering and Drycleaning Symbols

ASTM D5489 GUIDE TO CARE SYMBOLS



Wash

CYCLE + H₂O TEMP = SYMBOL

 normal	50C ●●● (120F)	 machine wash, 40C (warm), permanent press
 permanent press	40C ●● (105F)	
 delicate / gentle	30C ● (65F-85F)	



**do not
wash**



**hand wash
40C (105F)**



**hand wash
30C (65-85F)**

ASTM D5489 GUIDE TO CARE SYMBOLS



Bleach



**any bleach
when needed**



**only non-chlorine
bleach when needed**



do not bleach



Dry



**line dry /
hang to dry**



drip dry



dry flat



**in the shade
(added to line dry,
drip dry, or dry flat)**

ASTM D5489 GUIDE TO CARE SYMBOLS



Dry



Tumble Dry

CYCLE + HEAT SETTING = SYMBOL

 normal	 high	 tumble dry, high
 permanent press	 medium	
 delicate / gentle	 low	 do not tumble dry
	 no heat	

ASTM D5489 GUIDE TO CARE SYMBOLS



Iron

(dry or steam)



high
200C (390F)



medium
150C (300F)



low
110C (230F)



no steam
(added to iron)



medium iron
no steam

ASTM D5489 GUIDE TO CARE SYMBOLS



Dryclean



normal,
any solvent



normal, any sol-
vant except
trichloroethylene



normal,
petroleum
solvent only



do not
dryclean



short
cycle



reduce
moisture



low
heat



no steam
finishing

Care Labeling and the Textile Industry

Kay M. Villa

American Textile Manufacturers Institute

Ms. Villa is the Assistant Director of the American Textile Manufacturers Institute's (ATMI's) Product Services Division and serves as the staff secretary to the Consumer Affairs and Upholstery Fabrics Committees. She is responsible for coordinating ATMI's strategic standardization initiative under the Board of Director's Task Force on Global Competitiveness. Ms. Villa holds an M.S. in Textile Engineering and Science from North Carolina State University and degrees in Textiles and Interior Design from the University of Wisconsin.

I'm going to talk today about care labeling and how the textile industry interfaces with that. I'm going to reserve most of my comments to talk about the new care symbol systems. I want to talk about how the industry interfaces in terms of wet cleaning. I also want to thank the U.S. Environmental Protection Agency (EPA), Dr. Wentz, and Ohad Jehassi for inviting the American Textile Manufacturers Institute (ATMI) to be a co-sponsor for this program. We were first aware that EPA was looking at alternative dry cleaning techniques about 4 years ago. At that time, and since then, we have been contacted twice by EPA to find out what our industry's position is on this. Basically, however, we have not been involved in this process. We have a great deal at stake and in order for you to be successful, you must engage our industry in this process.

First of all, I want to talk about what ATMI is and what we represent. I also want to describe to you the fiber, textile, apparel, retail pipeline. It is a commerce stream, and it starts at one end with raw fibers—both natural fibers such as cottons and wools, and synthetic products such as nylons and polyesters. We convert them into fabrics which are handed over to an apparel manufacturer who cuts and sews the fabric into garments. The garment is then transferred downstream to the retailer who provides that product to the end consumer. ATMI represents one segment within this pipeline. We are involved in the actual manufacturing of textile products. This includes yarns, threads, fabrics, and in some cases, end products. We use techniques such as weaving, knitting, non-woven paper-type production, printing, dyeing, finishing, and tufting of these fibers into textiles or fabrics. We also have members that produce products such as bandages, carpets, comforters, sheets, linens, and literally thousands of different end products. But as an association, we do not represent apparel interests.

There's one other issue I'd like to address here, which is some of the terminology that has been floating around. I've often heard the discussion of garment care as being fabric care and textile care. From an industry perspective, we would prefer to use the terminology "garment and apparel care," because that's really what we're talking about. We're talking about a specific end product and addressing its cleaning techniques.

ATMI's member companies, consume approximately 80 percent of all fibers utilized in U.S. textile operations. The gross domestic product (GDP) of this fiber, textile, and apparel pipeline is \$60 billion. It is the second largest industry in the United States, following the auto industry at about \$67-69 billion. The fiber industry is about \$8 billion, textiles are \$25 billion, and apparel is \$28 billion. Textile sales in 1995 alone were \$69 billion. The GDP is an integration which takes out the value added in all of those steps. Over the past 10 years, our industry has been spending approximately \$2 billion annually to modernize our facilities. We're doing this for several reasons: to increase our productivity, increase our efficiency, and improve the quality of the products we're providing. We're also modernizing for a lot of environmental reasons: to reduce energy consumption, reduce water consumption, and to produce a more environmentally friendly product.

When we talk about consumer labeling, I want to make you aware of the fact that the industry actually complies with four different labeling regulations. At this point, we've only discussed one, which is Trade Regulation Rules on Care Labeling of Textile Products for General Wearing Apparel and Certain Piece Goods—I will just call it the Care Labeling Act. The other two regulations that are enforced by the Federal Trade Commission include the Textile Fiber Products Identification Act (TFPIA) and the Wool Products Labeling Act. The Wool Products Labeling Act goes all

the way back to the 1930's and is essentially a consumer protection regulation. So when you go out and buy your cashmere sweater, you in fact are getting cashmere, not mohair. The other regulation that the industry deals with is one on a state level. It's called The Uniform Packaging and Labeling Regulation, and it basically deals with the physical dimensions or characteristics of products. So when you go to the grocery store and you buy a can of tomato paste, and it says that it's 8 oz. or 12 oz., that in fact is a requirement under this rule. The enforcement under that rule occurs at the state level, so state metrology or state weights and measures offices are responsible for it. Our segment of the industry, in terms of producing carpets and home furnishings products, must include dimensions to describe to the consumer what they're buying.

The Care Labeling Act requires a number of different things. In fact, it requires different things of the textile industry than it does of the apparel industry. It is mandatory for apparel, but it is not required for home furnishings products. Our industry, since the promulgation of the rule in 1971, has provided care instructions to the consumer on a voluntary basis. The rule does not address industrial products. What happens in this pipeline stream is that we do not provide a permanent care label to each bolt of fabric that we sell to our customers. We typically provide that information on the invoice as the product is transferred downline.

TFPIA is really a very important regulation. It's applicable to apparel and home furnishings. There are mandatory requirements. Country of origin and manufacture identification is required to be permanently attached to the product at the point of sale. Fiber type, however, is provisional. Most industry people in the United States automatically provide this on a permanent care label, but it is a voluntary option. It is an important piece of information, however, because when the consumer goes to purchase an article of clothing, their decision is made based on previous experience with the product. So when I pick out a suit in a store and it says wool, I'm going to know based on the fiber type, what I can do with this product and what the expected life of it will be. Again, as we transfer the fabrics downstream to our customers, this information is generally provided on an invoice.

Now, I want to talk a little bit about ATMI in terms of how we relate to the environment. In 1992, we started a new program called Encouraging Environmental Excellence (E3). At this point in time, more than 50 percent of our members are involved in this program. What the program does is ask our members to go above and beyond local, EPA, and state environmental requirements. In our E3 1994 annual report, it talks about our 10 point program representing the minimum

criteria companies must meet in order to participate in the program.

I think the real selling point of the program is the fact that if a member goes through this process, they've essentially qualified for International Organization for Standards (ISO) 14001, the new environmental management system standard that will come out next year. I think it's a real feather in our cap that our members have done this. The only thing that would be required for our companies to meet ISO 14001 is for an outside third-party certifier to come in and audit the books. The E3 logo is essentially a marketing program for our members to show that they in fact are a company that is committed to environmental initiatives. Some of you may have seen this logo in the L.L. Bean catalog.

Now let's talk about ATMI's position on the Care Labeling Rule, with regards to the new wet and "eco-cleaning" techniques. ATMI does support the proposal to change the rulemaking to allow the optional use of symbols to provide consumers with care instructions. Additionally, we support the dual labeling requirement to provide dry cleaning and eco options (I'm going to use eco not just wet), meaning alternative technologies, to describe to the consumers that they have these options. Our support of that is based on the provision that the requirement would only be applicable to items that normally would be dry cleaned. If it were applicable to products that would normally only be laundered it would lead to increased testing for us, increase labeling costs, and could increase the consumption of perc and other solvents.

I think our E3 program demonstrates that ATMI does support eco initiatives. We do have some concerns about the potential of moving forward with these new technologies because these technologies have not been used with the pipeline of products that are out there. If the consumer has the idea that they can just take any of their clothing out of their closet and take it to a local Greener Cleaner, we would expect to see more damage claims. We would expect to see problems including shrinkage, color loss, dye transfer, color bleeding, felting of wools, stiffness in some fabrics, and water stains and water marks. I was very interested in the comments that were provided yesterday, both on the Greener Cleaner project in Chicago and in Germany, and I'm very pleased to hear that there are now up to 31,000 garments that have been tested with this new technology. We need more testing. The 31,000 samples that have been tested are minuscule compared to the 12 billion garments that are sold in the United States annually.

Yesterday, Dr. Josef Kurz told us about research being carried out in Germany. He indicated that approximately 200 million garments are cleaned annu-

ally. Please note that these 200 million garments only represent slightly over one and a half percent of the U.S. annual market. The German experience is a very good example, but it does not automatically correlate to the size and scope of the U.S. marketplace.

The industry will not be able to automatically modify our product, or reformulate to meet the rigors of these new cleaning technologies. That would include our spinning operations, how we take fiber and spin it to make it into yarn, how we take those yarns and then convert them into woven goods or knit goods. It would include how we scour, that is, how we clean the fabric before we prepare it for adding dyes and finishes. The technology that exists in the textile industry today is based on 300 years of product development. A lot of that product development has come over the last 50 years with the advent of a number of synthetic products and synthetic fibers. That doesn't mean that we won't change, but I'm not going to stand up here and say that our industry is automatically going to accept all of this and reformulate our products.

I also want to emphasize that, as we discussed yesterday, just because a product can be eco cleaned does not necessarily guarantee that the manufacturing

processes that went into the development of that end product were done in an environmentally friendly manner. So we have to be able to weigh these options. If it's more important on one end, what does it mean we give up on the other end?

I also want to stress the kind of time line that we're talking of in terms of taking fibers from one end of the pipeline and getting it down to the end consumer. Normally, most textile operations can take anywhere from 6 to 18 months to transfer the raw fiber to the end product that goes to the consumer. It will require a very large amount of time for the industry to make modifications. In some cases, it might be an easy fix; it might be something the company can do within a 2-month period of time to reformulate to develop a better product. But in some cases, we may never be able to find a solution that will take every single fiber, every single product and guarantee that it can be cleaned with these new technologies.

The other major factor that will really drive whether or not we are all successful is whether the consumer will accept the end product that comes out of the pipeline stream.

1

Care Labeling and the Textile Industry

Apparel Care and the Environment:
Alternative Technologies and Labeling
September 9-10, 1996

2

This is ATMI

- Manufacturing
- Techniques
- End Products

3

This is ATMI

- Membership represents 80% of fiber consumption
- GDP > \$60 B
- Modernization - \$2 B

4

Consumer Labeling Rules and Regulations

Textiles and Apparel Required To Meet Four Rules

- Care Labeling Act
- Textile Fiber Products Identification Act (TFPIA)
- Uniform Packaging and Labeling Regulation (NCWM)
- Wool Products Labeling Act

5

Care Labeling Act

Promulgated in 1971

- Labeling Requirements for Product Disclosure to the Consumer
 - *Apparel—Mandatory*
 - *Home Furnishings—Voluntary*
 - *Industrial—No Requirements*
 - *Upstream Manufacturers Supply Care Instructions Via Invoice*

6

TFPIA

Promulgated in 1950s

- Products
 - *Apparel and Home Furnishings*
- Product Information
 - *Fiber Type, Country of Origin, and Manufacturer's Identification*
- Manufacturer's Supply Information Via Invoice

7

ATMI and the Environment

*Encouraging Environmental Excellence Program
Promulgated in 1992*

- > 50% of ATMI Members Enrolled
- Company Programs Exceed EPA, State, and Local Requirements

8

ATMI and the Environment

*Encouraging Environmental Excellence Program
Promulgated in 1992*

- Environmental Management
10 Point Program
- E3 Members Meet ISO 14001

9

ATMI and Care Labeling

- Support Current FTC Rulemaking To Change Care Labeling Act

10

ATMI and Care Labeling

- Support Dual Labeling of Dryclean and Eco-Clean Systems
 - *Should Apply Only to Products Normally Drycleaned*

11

Implementation of Eco Cleaning Systems

- ATMI Supports Eco-Initiatives
- More Damages Seen if Customers Perceive that Methods Work for All Products

12

Implementation of Eco Cleaning Systems

Limitations

- Industry cannot Automatically “Turn Over” or Modify Products
 - *New Cleaning Methods Require New Formulations*

Implementation of Eco Cleaning Systems

Limitations

- Fiber, Textile, and Apparel Retail Pipelines
 - *6 to 18 Months*
- Phase-In Time Required by Industry
 - *Minimum of Several Years*

Care Labeling and the Apparel Industry

Carl Priestland

American Apparel Manufacturers Association

Mr. Priestland is chief economist for the American Apparel Manufacturers Association (AAMA). For over 2 decades, Mr. Priestland has represented AAMA and its members at international negotiations on bilateral and multilateral trade agreements. He is also active in the International Apparel Federation, for which he developed the current structure for reporting world-wide apparel production and trade. Mr. Priestland holds an M.A. in Economics from American University and a B.A. from Western Michigan University.

It's a pleasure for me to be here today. American Apparel Manufacturers Association (AAMA) members make about 70 percent of all the apparel produced in the United States, and they have plants in almost every state. So we contribute a great deal to the economic well-being of the United States.

Half of all the garments purchased in the United States are made here. The apparel industry has sales of \$50 billion, provides 860,000 jobs, and makes 6.5 billion garments that require care instructions. As you've already heard, the United States is about to adopt a care symbol system that will provide an alternative to written care instructions. To be acceptable to the Federal Trade Commission, this system must relay the same information to the consumer that is now given via written instructions. We've been working on this for some 4 years now; it isn't something new that has just come up in the last 6 months or so.

When we started, the change was brought about by the needs to harmonize the labeling requirements within the North American Free Trade Act (NAFTA). In the NAFTA text itself, it says that the members are committed to harmonizing the required labeling rules of the three countries, that's why we're here. Since the United States was the only country that did not have a care symbol system, it was up to us to change. In the case of Canada, it's voluntary, but in the case of Mexico, it is required if you don't use written care instructions.

The proposed care label system in NAFTA is also an American Society for Testing and Materials system, and it is fairly compatible with the International Organization for Standards (ISO) system. There are a number of points I think we should make here when we talk about this care symbol system and care labeling in general. U.S. industry has a vested interest in

providing consumers with the information they need to maintain garments. There is a desire to have this care symbol system, and it is something that we all feel is very important.

When consumers look at garments, they look at labels for two things: fiber content and care instructions. Whether or not they buy that garment depends on what they find. If the care instructions are too complicated, they may not buy it. If the fiber content is not right, even if there are good care instructions, they may not buy it. So, it's very important that we have a system that will provide the consumer with what they need and also have consumer satisfaction.

While the apparel industry has the primary responsibility for care labeling (because we put the labels on the garment during assembly) retailers at the other end—and the yarn and fabric producers—also have a vested interest in ensuring that the consumer receives proper care instructions. The use of incorrect care instructions for the materials used in the garment can cause damage, and damaged garments cause consumer dissatisfaction. That's the one thing we don't want. We want to make sure when we put something out to the consumer, it has the instructions necessary to maintain that garment properly for its useful life. All the materials in it have to be tested. We have to know what those materials will do as we go along, as the garment is being used and cared for.

Care labeling is not new; we've had a mandatory care labeling requirement for 25 years. The important thing here is that the United States is one of the very few countries that *requires* this. Most countries of the world that accept a care symbol system or written care instructions do not require it to be put on the garment permanently. There are very few countries that require it. So we're very concerned that we have the time frame

necessary to do what we decide to do. We believe that it's extremely important that any modification of care labeling rules be done with great care and with sufficient lead time to adjust to the changes. We've talked about this in the last 2 days in terms of wet processing and dry cleaning in general, which, as everybody pointed out yesterday, is only 10 percent of the total amount of garments being cared for. It is important that we put out care instructions that say the kinds of things we need the consumer to know. We need to know what's going to happen when the consumer throws a garment in the laundry or the professional cleaner takes it and puts it in their system, whatever that system is.

It's important also that we have a system that is useful not only in NAFTA, but also worldwide. Almost \$100 billion in garments are sold worldwide just to the developed countries; the European Community and the United States each import about \$38 billion worth of apparel a year, Japan imports another \$16 billion, and \$8 billion is imported by the rest of the developed countries. Ninety percent of these imports come from the emerging countries of the world. We have a huge amount of international trade. One of the things that we were cognizant of and wanted to make sure of when we develop the system is that this system be compatible with the ISO system to the extent possible. We want to have a single worldwide care label symbol system that will provide icons for consumers worldwide to understand how to care for their garments.

The only major concern we have between the NAFTA rules and the ISO is that we believe that any system developed worldwide should not be encumbered by any type of proprietary trademarks. We will

work with the ISO system and try to arrive at something because we believe sincerely that one worldwide system is important. I think we're going to be able to do that. It will take a little time, but I think it's possible.

In conclusion, the apparel industry is committed to working with its suppliers to make sure the materials we use in garments are compatible, and that how the consumers take care of those garments will provide them with a long useful life. The worst thing we can do is to make a garment that shrinks, or the colors run, or print falls, or whatever. The retailers are the first line to get hit with this problem, but we also run into it because we have the primary responsibility for what we use in garments.

We need time to adjust. We cannot adjust in a few weeks or a few months. It takes 6 to 9 months just to get new woven labels to put on garments and to utilize the inventory of current labeling. It is not an easy task. And that's just one area; we're talking about changing the way garments are dry cleaned and the way in which consumers perceive proper cleaning for their major garments. The worst thing I think we could have is to have an expensive wool suit, coat, or jacket shrink. Consumers would be up in arms immediately if that happened. Besides, we not only have to worry about shrinkage of the shell fabric, but there are five or six different fibers and fabrics in most tailored clothing, and that's the area where most of the dry cleaning and refurbishing on a professional basis takes place. Anything that we do to utilize wet cleaning in this whole process needs to be done very carefully, but it needs to be done and that's why we're here today.

One Retailer's Perspective on Care Labeling, Consumers, and the Environment

Jennifer Holderness

Gap, Inc.

Ms. Holderness is Manager of Product Standards and Environmental Assessment for Gap, Inc. She is responsible for developing product standards, including the environmental evaluation of products, as well as for assessing the environmental performance of the company's current and potential suppliers. Ms. Holderness holds an M.S. in Natural Resources Policy and Management from the University of Washington and a B.S. in Environmental Sciences from the University of Virginia.

I want to thank you all on behalf of the Gap for inviting us to participate today. This is a very exciting initiative. When I came to the Gap two and a half years ago, we sat down and started prioritizing our environmental impacts and some of the initiatives we wanted to tackle. We looked at these issues, not only in relation to manufacturing and our suppliers, but also our products. It was clear that one important issue was the care of the garment, based on the chemicals that were used. Based on all the work that's been done over the last few years, my comments are probably a summary of what's already been stated. Also, while I don't really have any legal obligation to provide you with a disclaimer, I do want to say that my comments are reflective of what we believe at the Gap, and they're not necessarily representative of our industry.

I want to give you a little bit of background on the Gap, especially for our European visitors who may not see the Gap in every mall, yet. We are a specialty retailer providing casual clothing for men, women, and children under five brand names, the Gap, GapKids, babyGap, the Banana Republic, and the Old Navy Clothing Company. We operate approximately 1,800 stores, and this number goes up almost daily, in the United States, Canada, United Kingdom, Germany, France, and Japan. Currently, we also employ somewhere in the neighborhood of 66,000 employees worldwide. It's a pretty extensive organization and because of this, the impact we have on the environment is not insignificant. It is obviously not something we can ignore. When I came to the Gap, we began looking at ways to influence not only the manufacturing of our products, but also other areas. We looked at construction, looked at our internal practices, and looked at any

areas where we could have an impact. I think that anyone in the company would agree that profitability and responsibility are not exclusive and in fact someone argued that these circles should overlap. I just wanted to make it clear that we do believe that these two will work in sync and are looking for ways to support this. Initiatives such as this conference really get to the heart of this issue. Not only are we talking about enhancing customer satisfaction but we're also talking about improving environmental performance on a very large scale.

In terms of customer satisfaction, we have found, through numerous focus groups both here and in Europe, that the care of the garment is something that's important to customers. It's something that they do look at, particularly for the shoppers of Banana Republic, which features higher end, more tailored clothing. As Jo Patton mentioned, I am serving on the University of California, Los Angeles Advisory Board on their wet cleaning demonstration project, to support their research. The retailer really is on the front line of garment care issues. It's our label, and it's our reputation that's at stake here. We need to make sure that these initiatives are going to work. Inclusive in that is looking at whether this process is going to perform well on all fabrics. We also want to make sure that when we go ahead with something like this that the environmental reductions are measurable. We're looking closely at the tradeoffs involved in wet cleaning and in the life-cycle of a garment from textile manufacture through to disposal. Also, we can't forget the financial impact both on the manufacturer and the customer. Obviously, we're going to need to put a lot of testing into this to make sure it's going to work. On the issue of care labeling, we want to make sure the

customer is not going to be confused. We find that we really only have about 10 seconds with the customer during their decision-making time, and we want to make sure that, in that time, we're giving them the information that they need in the way they can easily understand. That brings me to the next point, educating the customer and how we are going to do that.

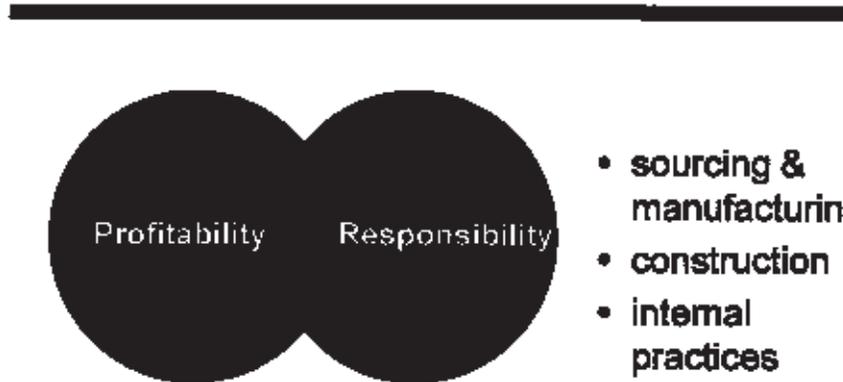
There are things the retailer can do, but other forms of education such as advertising may be needed. The success of this initiative really will be determined in the market place, and I think that we really have to make sure that the marketplace is ready when we have it together.

A Retailer's Perspective on Apparel Care and the Environment

Gap, Inc.

- **Specialty retailer - casual clothing**
- **Five brand names - Gap, GapKids,
babyGap,
Banana Republic &
Old Navy Clothing Co.**
- **1756 stores - U.S., Canada, U.K.,
Germany, France, Japan**

1



2

Apparel Care

- **Support initiatives to: enhance customer satisfaction and improve environmental performance**
- **Considerations**
 - does process perform well on all fabrications?
 - are the environmental reductions measurable?
 - what is the financial impact on both the manufacturer and the customer?
 - will the customer be confused by a new label?
 - how can we best educate the customer?

Care Labeling and the Fabric Care Industry

Mary Scalco

International Fabricare Institute

Ms. Scalco is Director of Government Relations at the International Fabricare Institute (IFI), the association of professional drycleaners and launderers. Ms. Scalco, formerly Supervisor of Textile Testing at IFI, monitors and responds to state and federal legislative issues and oversees IFI's care labeling program. Ms. Scalco previously worked in quality control for a drapery manufacturer and worked in research and development for a prominent carpet manufacturer.

The International Fabricare Institute (IFI) is a trade association for professional dry cleaners and launderers. IFI's membership is primarily comprised of dry cleaners—approximately 6,000—but we also have members from Better Business Bureaus, retailers, educators, allied trades, and apparel and textile manufacturers. IFI is affiliated, or works closely with local and state drycleaning associations as well as the Neighborhood Cleaners Association-International (NCA-I). NCA-I has approximately 4,000 dry cleaning members. It is estimated that there are between 30-35,000 dry cleaning plants in the United States. Since many of the members we represent have more than one operating plant, I am confident in saying that we represent the interests of the dry cleaning industry.

Professional cleaners depend on care labels. Their ability to provide to consumers a quality, serviceable garment depends on the care label providing accurate, and complete information. Cleaners are professionals. They have a working knowledge of fabrics. There's no way, however, that they can test each and every component which goes into manufacturing a garment to see how it will respond to cleaning. The dyes, fabric finishes, trims, interfacings, interlinings, and linings are often not visually or readily identifiable as presenting problems during cleaning. As Carl Priestland indicated, in most tailored garments, there are five to six fibers and fabrics that go into the inner workings of a garment. Think of your local dry cleaner, of who that business person is. He's usually not a textile graduate. About one-third of our industry is now Korean owners. They have an additional barrier with the language problem. So, yes, dry cleaners are professionals. No, dry cleaners cannot be expected to figure out how every single gar-

ment can be processed. That is why the Federal Trade Commission (FTC) requires the garment manufacturer to determine the appropriate method of care. The manufacturer has the resources available to evaluate each and every component that goes into the make-up of a garment. This is especially true as new processes are being looked at and developed for the cleaning of textiles.

Unfortunately, what the fabricare industry experiences is that the method of care specified is not always appropriate for the garment. All too often the following scenario occurs:

A customer's garment is damaged in cleaning even though the dry cleaner followed the care instructions. Because the care instructions were followed the cleaner informs the customer that they should return the garment to the retailer because the manufacturer did not provide adequate or proper instructions. The retailer tells the customer, "If the dry cleaner were a professional and handled the garment properly it would not have been damaged." The customer then returns to the dry cleaner unsatisfied and, to say the least, unhappy. The dry cleaner pays the customer, not because he felt he was responsible, but to retain the business. Still, the customer often loses faith in the dry cleaner's ability to do a good job.

The average dry cleaner has an average yearly revenue of \$200,000 with a profit margin of 2-3 percent. The above referenced scenario cannot happen too many times before that profit is seriously depleted.

Garment Damage

As I stated, the fabricare industry does find that garments are damaged all too often even when the care instructions are followed. Both IFI and NCA-I each house an analysis laboratory which attempts to ascertain how damage to a garment occurred and if that damage could have been prevented. Consistently, over the years, the highest percentage of garments received in IFI's laboratory have been damaged as the result of inaccurate or incomplete care labeling. Statistics from NCA-I's analysis laboratory support IFI's experience.

IFI developed a database which is regularly shared with the FTC. The database contains garment manufacturer name, RN Number, fiber content, country of origin, garment description, and damage type. In the past IFI has shared information in the database not only with the FTC but with apparel and textile manufacturers. NCA-I has made available to the FTC photos of damaged garments and corresponding care labels as well as the analysis laboratory report.

As an educational tool for the dry cleaner to use with consumers, IFI and NCA-I produce bulletins which give details on garments which have been damaged during cleaning. These are garments which the laboratory has received a number of times. IFI's bulletin "Not In Vogue" provides photos as well as a description of the garment. In addition it gives the results of IFI's contact with the manufacturer. In most cases IFI has found that the manufacturer is more than willing to work with the consumer either in the form of a refund or replacement.

Fabricare Industry's Involvement in Care Labeling

Because the fabricare industry is so dependent on care labels providing accurate information, IFI has made sure that it has played a role in the development of the FTC's Care Labeling Rule. Industry members have provided not only written comments but oral testimony, both prior to the adoption of the Care Labeling Rule in 1972 and in the years leading up to the FTC's

revision in 1984. Members of the fabricare industry are active members of the textile organizations influencing care labeling both in the United States (American Association for Textile Chemists and Colorists and American Society for Testing and Materials) and internationally (International Organization for Standards).

The fabricare industry has long held the position that alternative labeling should be required. That the care label should provide all appropriate methods, not just one which may not even be the best care method for the garment. Providing all methods of care gives not only the consumer, but the professional cleaner the option of choosing how that garment should be handled. The availability and breadth of options becomes especially important when discussing alternatives to dry cleaning, specifically wet cleaning. Unless an alternative is a 100 percent replacement, the fabricare industry would have trouble. It couldn't financially accept the liability of cleaning a garment unless the procedure is recommended on the care label.

Another position the fabricare industry strongly believes in and continually works for is that the reliable evidence requirements of the Care Labeling Rule be strengthened. Currently the Rule states that "the manufacturer must establish a reasonable basis for the care information." "Reasonable basis" includes: tests, current technical literature, past experience, and industry experience. The information can be subjective as well as objective; testing is not required. That results in a number of garments being damaged after cleaning. This is a disservice not only to consumers, but also to the fabricare industry. Professional cleaners are experiencing financial losses, not only because of reimbursement to the customer for a garment, but also more seriously because of the loss of consumers' trust and future business.

Manufacturers need to be held accountable and responsible for the care information they provide. The FTC needs to do a better job of enforcing the requirements of the Care Labeling Rule. Since its inception, the FTC has only prosecuted a handful of companies for violation of the Care Labeling Rule while thousands of consumers have had the unfortunate experience of having a garment damaged after cleaning.

Care Labeling and the Fabric Care Industry

Mary Scalco

International Fabricare Institute

Industry's Position on Care Labeling

- Support Alternative Labeling
- Strengthen “Reasonable Basis” Requirements

1

Fabric Care Industry's Involvement

- Oral Testimony
- Written Testimony
- FTC Access to Database
- Active Member of AATCC, ASTM, and ISO
- Participate in DfE Program

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IFI Damage Analysis Statistics

Year	Total Garments Received	Approx. % of Damage Attributed to Inaccurate Care Labeling
1988	43,658	45%
1989	44,293	41%
1990	46,906	38%
1991	46,760	41%
1992	44,080	41%
1993	36,294	33%
1994	30,349	35%
1995	25,160	41%

Care Labeling and Consumers

Nancy L. Cassill

University of North Carolina at Greensboro

Dr. Cassill is Associate Professor of Textile Products Marketing in the Department of Clothing and Textiles at the University of North Carolina at Greensboro (UNCG). At UNCG, Dr. Cassill teaches courses in merchandising, retailing, textile products marketing, textile products consumer behavior, and international sourcing. She serves as President-elect for the International Textile and Apparel Association and is a member of the International Fabricare Institute Technical Advisory Board. Dr. Cassill holds degrees from Purdue University, Indiana University, and the University of Tennessee-Knoxville.

Today's consumer wants apparel that is easy to care for, comfortable, and priced affordably to fit their budget and lifestyle. These apparel preferences have challenges for fiber producers, fabric mills, apparel manufacturers, retailers, and fabric care specialists.

Today's Consumer— Educated and Demanding

Today's consumer is educated and demanding. The consumer has two thoughts: "save me energy" and "save me stress." Save me energy translates into the following apparel preferences:

- Make it simple to buy apparel
- Make it simple to care for apparel
- Make it simple to understand and to wear apparel

Save me stress means:

- Reduce problems
- Guarantee fair prices
- Offer a simple return policy

Today's consumer also has attitudes about "casual workplace apparel" and new apparel products. The casual workplace (also known as dressing down) has been in the U.S. corporate environment since 1979. In the past 3 years, there has been an increase in wearing casual wear to work. This increase has been evident by: the growing number of companies that have insti-

tuted casual day, and the increased number of casual days for companies.

In 1996, casual apparel for the workplace translates as "casual and comfortable" apparel. Recent research examining the casual workplace with U.S. Fortune 500 companies has found that the casual workplace has not peaked. There has been a rapid acceleration of Fortune 500 companies adopting this practice within the last 2 years (1994-96) and the number of companies instituting the casual workplace continues to increase. Casual apparel has become part of the corporate culture. Research has found that casual apparel improves workplace morale and is a no cost benefit to companies. No wonder over two-thirds of all U.S. companies have established some form of casual dress for the workplace.

New apparel products are the life of the textile and apparel industry. Today's consumer is searching for new, exciting and different apparel products. However, one remembers the distressing apparel retail environment in 1995 and 1996, when consumers opted to purchase hard goods, such as computers, instead of soft goods, such as apparel products. Lack of product innovation, purchasing computers instead of apparel, and consumers viewing apparel product sameness, has caused consumers to push the limits on life expectancy of apparel (a real challenge for fabric care specialists).

Consumer attitudes about shopping are interesting. In 1996, traditional shopping is less leisure driven and more of a chore. The retail marketplace presents pricing games. Time and energy constraints, lack of convenience (consumer may be less brand and less store loyal), and less interest in shopping are three reasons why some consumers are shopping less than 1 hour a week.

Consumer Attitudes About Care Labels

Many educated consumers are label conscious. For these consumers, care is an important criterion. Care labels become increasingly important with the in-store wrinkle resistant merchandising that emerged in the early 1990's. In addition, consumers still look at brand labels, fiber content, and now closely examine country of origin labels since child labor issues have come to light.

However, consumers are not educated about the difference between dry cleaning and laundry services. Specifically, consumers are not educated about the difference between wet cleaning and home laundry. Consumers distrust low labeling; "Dry Clean Only" may mean other (successful) methods. Many consumers do not read care labels while others do not take care labels seriously. Manufacturers and retailers are making guarantees about the finished apparel product and consumers have guarantee expectations (not always consistent with manufacturer and retailer expectations).

Distrust with labeling is but one part of a larger issue—honesty with all packaging is an issue. In addition to distrust (with care requirements, country of origin, and fiber content), some labeling information is not understood by the consumer. For example, the U.S. consumer still does not understand "microfiber" and "denier," even though these products have been in the U.S. marketplace for several years.

Consumer Perspectives: Wet Cleaning and Dry Cleaning

If the consumer interpretation of "Apparel that is easy to care for, comfortable, priced affordably to fit budget and lifestyle" is not enough of a challenge, the fabric care industry has wet cleaning and dry cleaning challenges.

Wet Cleaning Perspectives

Research conducted at the University of North Carolina at Greensboro has found interesting results related to wet cleaning perspectives. Consumers do not differentiate products that should be wet cleaned versus home laundered. In addition, the consumer has not been educated that the fabric care specialist wet cleans. Opportunities exist for consumers to utilize wet cleaning services since many consumers: (1) want professional appearance (including casual wear apparel), (2) are concerned with the environment (but may

not practice environmental actions), and (3) realize the cost (in time and appearance) of home laundry. For fabric care specialists, wet cleaning services may be targeted to consumers by exploiting these opportunities.

It is important to know that consumers can use (but are not using) high temperatures in home laundering of many apparel products. Results of using lower temperatures (such as soil retention, unsuccessful stain removal, and product appearance in jeopardy) result in dissatisfaction with the apparel product.

Dry Cleaning Perspectives

Research results also indicated that most consumers think all products are dry cleaned by the fabric care specialist. In addition, consumers question environmental issues, view the dry cleaning process as costly, attempt to launder "Dry Clean Only" items, and use the dry cleaner to correct stain and appearance problems.

Challenges and Opportunities

Get/Remain Involved in the Integrated Partnerships: Correct Care Label Myths with Industry and Consumer

This conference is a proactive step in addressing consumer challenges—and identifying opportunities for the fiber, textile, apparel, retail, and fabric care industries. The entire product chain (which includes the fabric care industry) is concerned with consumer apparel product satisfaction. Continual information exchange, and problem solving should occur with the following groups:

- Fabric care specialists
- Fiber producers
- Chemists and colorists
- Testing - Standards
- Textile mills
- Manufacturers (apparel, home furnishings)
- Converters
- Retailers
- Importers/Exporters

- Government

Topics of primary importance should include:

- Care labeling.
- Product/service trends.
- Fabric care industry's expertise and service at the product development stage.

This conference should be a starting point for future industry-wide task force(s) with quality assurance personnel. Panels and/or seminars at industry-wide conferences in addition to committees (such as American Association of Textile Chemists and Colorists committees) are excellent problem identification and problem solving forums. Product/service planning and purchases directly impact **everyone's** bottom line.

Talk To Your Consumers

Communicating with consumers is imperative in today's competitive environment. Fabric care specialists must get consumers to plants for wet cleaning *and* dry cleaning. Verbal and written communication should include the following 4 C's:

- Communicate why wet cleaning is better for casual apparel than home laundry
- Clarify at home laundry v. wet cleaning
- Control: Quality assurance of appearance
- Convenience

Consumers are aggressive and demanding when dissatisfied. Listen to consumers—they will appreciate your listening. Consumers offer good ideas and solutions, especially in test marketing new ideas. This communication will help reaffirm your marketing strategies. Benefits can include: store, brand, fiber, country loyalty, and a cost effective strategy to maintain your customer base.

Re-Evaluate Your Technology Approach

Technology is changing rapidly and it is imperative to re-evaluate your technology approach. An updated customer data base provides opportunities with product and service sales history, consumer products preferences, and data sharing with other product channel members.

Use Consumer and Product Information Provided

One final challenge: provide not simply knowledge, but education. This will illustrate your understanding of consumers' apparel needs and your interest in keeping the consumer satisfied with apparel products and services.

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APPAREL CARE AND THE ENVIRONMENT

ALTERNATIVE TECHNOLOGIES AND LABELING

Nancy L. Cassill

Department of Clothing and Textiles

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CARE LABELING AND CONSUMERS

**"Apparel that is easy to care for,
comfortable, priced affordably
to fit budget and lifestyle"**

3

- Today's Consumer — Educated and Demanding
- Consumer Attitudes about Care Labels
- Consumer Perspectives: Wet Cleaning and Dry Cleaning
- Challenges and Opportunities

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I. TODAY'S CONSUMER — EDUCATED AND DEMANDING

A) Who are today's consumers?

1) Consumers Have Two Thoughts:

“Save Me Energy”

- Make it simple to buy apparel
- Make it simple to care for apparel
- Make it simple to understand and to wear apparel

5

“Save Me Stress”

- Reduce problems
- Guarantee fair prices
- Offer a simple return policy

(Adapted from Yankelovich Partners)

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Consumer Attitudes about Apparel:

Casual Workplace ("Dressing Down")

CASUAL WEAR on increase ... for now

- Casual dress at work
- 1995: "The Stuff That's Important to Me"

CASUAL AND COMFORTABLE

(Yankelovich Monitor)

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Casual Workplace ("Dressing Down")

- Fashion Cycle: Where is casual workplace?
 - Casual workplace has not peaked
 - Rapid acceleration of U.S. Fortune 500 companies adopting within last two years (1994-96)
 - Has become part of "corporate culture"
 - Improves workplace morale
 - No cost benefit to companies
- 2/3 U.S. Companies have established some form of casual dress

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"New" Apparel

- Consumer is searching for new, exciting and different apparel products
- Pushing "limits" on life expectancy of apparel

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Attitudes about Shopping:

Traditional shopping is less leisure driven/more of a chore

- Pricing games
- Time/energy constraints (less time)
- Convenience issues (may be less loyalty)
- Absence of fun/experience (less interest)
- Overall "pain" to consumer (shopping less than 1hr/wk)

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II. CONSUMER ATTITUDES ABOUT CARE LABELS

- ***Educated*** consumers who are "label conscious"
 - Care is important criterion
 - Care labels (especially with in-store "wrinkle resistant" merchandising)
 - Brand labels
 - Country of origin labels
 - Fiber content

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- ***Not*** educated about the difference between dry cleaning and laundry services
- ***Not*** educated about the difference between wet cleaning and home laundry

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- Distrust with "low labeling"
 - Many consumers do not read care
 - Consumers do not take care labels seriously
 - "Dry clean only" may mean other (successful) methods
 - Manufacturers/retailers making "guarantees" about finished product

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● Distrust with labeling

- Honesty with all packaging is an issue
- Care requirements, country of origin, fiber content
- Some labeling information not understood (microfiber, denier)

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III. CONSUMER PERSPECTIVES: WET CLEANING AND DRY CLEANING

"Apparel that is easy to care for, comfortable, priced affordably to fit budget and lifestyle"

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Wet Cleaning Perspectives

- Can use (but not using) high temperatures, resulting in:
 - Soil retention
 - Unsuccessful stain removal
 - Appearance in jeopardy
 - Dissatisfaction with product and service
- Want professional appearance with "casual wear" apparel
- Concerned with environment (may not practice)

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- Has not been educated that fabric care specialist "wet cleans"
- Does not differentiate products that should be wet cleaned vs. home laundry
- Wet cleaning not at cost of dry cleaning
 - At cost (time, appearance) of home laundry

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Dry Cleaning Perspectives

- Think all products are dry cleaned
- Questions environmental issues
- Views process as costly
- Attempts to wet clean "Dry clean only" items
- Uses dry cleaner to correct problems (stain, appearance)

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IV. CHALLENGES AND OPPORTUNITIES

*Get/Remain Involved in the Integrated Partnerships:
Correct Care Label Myths with Industry and Consumer*

- With**
- Fabric care specialists
 - Fiber producers
 - Chemists and colorist
 - Testing - Standards
 - Manufacturers
(apparel, home furnishings)
 - Converters
 - Retailers
 - Importers/Exporters
 - Government

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About

- Care labeling
- Product/service trends
- Fabric care industry's expertise and service

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How

- Task force(s) with Quality Assurance personnel
- Panels, seminars at conferences
- Industry-wide conferences/committees

Why

- Their product/service planning ***and*** purchases directly impact ***your*** bottom line.

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Talk To Your Consumers

Must get consumers to dry cleaning plant for wet cleaning and dry cleaning

- **Communicate** why wet cleaning is "better" for casual apparel
- **Clarify** "at home" laundry vs. wet cleaning
- **Control:** Quality assurance of appearance
- **Convenience**

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Consumers are aggressive and demanding when dissatisfied

Listen to consumers

- They will appreciate your "listening"
- Consumers offer good ideas and solutions
- Test market new ideas
- Reaffirm your strategies
- Benefit—store, brand, fiber, country loyalty
- Benefit—cost effective strategy to maintain customer base

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Re-Evaluate Your "Technology" Approach

- Opportunities with product/service sales history, preferences
- Data "power" with retailers and manufacturers

Use Consumer and Product Information Provided

- Provide not simply knowledge, but education



Apparel Care and the Environment

Alternative Technologies and Labeling

Summary of Discussion

Session III



Jo Patton of the Center for Neighborhood Technologies (CNT) opened the discussion by thanking the speakers. She said that the conference had been informative and provided an opportunity to hear from apparel and textile manufacturers, communicate new developments, and decide where to go from here. She said the conference had made her optimistic about the future. She then opened the floor to comments and questions about what the next steps might be.

Bill Seitz of the Neighborhood Cleaners Association-International (NCAI) stated he had waited 45 years for the kind of dialogue that took place at the conference, and he couldn't be more pleased with the results. He stated that, in the final analysis, all the participants really serve the same master—the consumer. As a result, everything and anything that gets done jointly will benefit everybody.

Mr. Seitz stated that many people in the dry cleaning industry have looked upon the industry as a kind of necessary evil, but it is an extremely important part of the process. Talking about the textile industry in general terms is really a mistake, because the textile industry, just like the dry cleaning industry, has broad ranges of expertise and problems.

Mr. Seitz stated that NCAI's 1996 report on 1995 garment analysis (a copy of which is available) addresses these issues. It not only talks about the types of problems but the types of companies who are creating the problems. Sears, JC Penney, K Mart, and the Gap do not appear in the garment analysis reports, because they never have problems. Some of the companies in the report, however, are among the "who's who" of fashion: Ann Klein, Burberry, Calvin Klein, DKM, Ellen Tracy, Georgio Armani, Jones New York, Liz Claiborne, Nordica, Tommy Hilfiger, and so forth. These companies use labels that say "dry clean only." The NCAI report makes the point that consumers blame the manufacturer or the retailer for damages, but only *after* they place blame on the dry cleaner. Dry cleaners end up paying for many garments that they shouldn't because they want to keep the customers' goodwill. Mr. Seitz said that it's not just a question of paying for the garment. The lost customer in many cases is more expensive than the garment, and that's a decision the dry cleaner makes that he would estimate is in the area of hundreds of thousands of dollars a year. He said that dry cleaners need a better and closer working relationship with the textile industry.

Mr. Seitz expressed concern about remarks made about the Federal Trade Commission's (FTC's) future responsibility. He stated that regulations don't mean much unless there is enforcement. He reiterated that there have only been six or seven cases brought against manufacturers in 25 odd years of enforcement, yet thousands and thousands of garments fail every year. He said he would like to see the enforcement gap close up a little bit so dry cleaners are not faced with the responsibility for failed garments. There are



Apparel Care and the Environment

Alternative Technologies and Labeling



Summary of Discussion

Session III (Continued)

many garments that are improperly labeled, many are not labeled at all, and many are imported and have misleading labels. He stated that the notion that dry cleaners encourage low labeling in order to get more business is not true. Low labeling happens because the manufacturer often perceives that the dry cleaner will clean the garment better than the consumer. Given the changing world for the textile industry, dry cleaners, and the consumer, working together will be the solution to solving the problem.

Connie Vecellio of the Federal Trade Commission (FTC) stated that the FTC does enforce the care labeling rule and estimated that in the last 4 years they brought six cases. Prior to that FTC only brought one case because FTC spent quite a few years promulgating and amending the rule, a process that was quite lengthy and took up a lot of resources. FTC is now committed to enforcing the rule and is doing so. Ms. Vecellio requested the information referenced by Mr. Seitz.

Jack Weinberg of Greenpeace began his comments by thanking those responsible for making the meeting possible and expressing his belief that the meeting had been very productive. He explained that he had learned a lot about the labeling issue and was pleased that many people were discussing environmental concerns. He reminded people that as a representative of Greenpeace, he was most concerned with the environmental impact, but respected other people's interests.

Mr. Weinberg referred to the discussions concerning consumer education and suggested that if people could identify areas where the various interests can agree on consumer education, Greenpeace can be helpful in getting the message out. He believes Greenpeace can be very helpful in consumer education on the environmental issues where environmentalists can in good conscious have the same opinion.

Mr. Weinberg expressed some concern about care labeling. He wants to ensure that wet clean labeling actually achieves its intended objective. His concern is whether a wet cleaning label will be part of a transformation of moving more garments from dry cleaning to wet cleaning or whether a wet cleaning label will become a mechanism for fabricating a market and reinforcing that some garments need to be dry cleaned and some garments need to be wet cleaned. Mr. Weinberg expressed his belief that some substantial portion of clothing marked dry clean only can be very successfully wet cleaned.

Mr. Weinberg said that waiting to put wet clean labels on clothing until enough professional cleaners have the capability is a "chicken and the egg" problem. Cleaners will not do it until manufacturers require it. If only one label is required and it is either a dry clean label or a wet clean label, this will lead to additional problems while the professional garment care industry works to improve their techniques. He recommended a label that essentially says "professionally clean this garment." He suggested that this will allow wet cleaning technologies to be phased in as they become available.

Ken Adamson from Langley Parisian Limited in Ontario, Canada, provided some additional information on the Canadian wet cleaning project. He



Apparel Care and the Environment

Alternative Technologies and Labeling



Summary of Discussion

Session III (Continued)

decided to use care labeling as a guide, but leave it to the operators to decide which cleaning method to use. He believes that the worst thing we could do is to end up with a wet cleaning ghetto and a dry cleaning ghetto. He thinks that the fabric care specialist has to balance the two cleaning processes to optimize their operation based on environmental concerns and the garments that he or she is handling.

Jo Ann Pullen of the American Society for Testing and Materials (ASTM) expressed her pleasure with the openness of the meeting. She explained that ASTM standard is a very easy standard to revise and improve, as long as technical information is available on which to base the revisions. She expressed some concern with Mr. Weinberg's proposal for a single label, unless that label has very specific information.

Ms. Pullen encouraged everyone to work with Europe and Europe to work with the United States through the American Association of Textile Chemists and Colorists (AATCC) to gather the information needed for specific conditions. Certain categories of textiles with trims may need a specific condition. She explained that there are different detergents for different fibers or variations in how to do things. Ms. Pullen encouraged the group to develop a label that has technical information that meets the needs of industry and wet cleaners.

Manfred Wentz of FLARE/AATCC thanked Ms. Pullen and explained that, as discussed the previous day, they have already established a close working relationship with the European developments as well as a collaborate effort to do international round robin testing to assess individual parameters necessary for identification. He mentioned that they have already received a proposal from the European Standard Organization on wet cleaning that will be scrutinized and adapted to the needs of the U.S. market. He repeated from the previous day's discussion that Dr. Charles Riggs already had one of his students visiting Hohenstein to get familiar with European wet cleaning testing protocol. The challenge, he suggested, is getting the appropriate information necessary to the apparel and textile industry so that they feel comfortable in identifying the proper care methods.

Ms. Pullen mentioned that in the ASTM system you can put both dry clean and wet clean on the label and report both processes.

Kay Villa of the American Textile Manufacturers Institute (ATMI) asked Mr. Weinberg to clarify Greenpeace's goals.

Mr. Weinberg explained that Greenpeace originally became involved in the issue because they are involved in a worldwide campaign to faze out production and use of certain substances, including perchloroethylene (perc). That is the primary goal, although Greenpeace has other goals. He stated that one of the intermediate goals is promoting wet cleaning. Another Greenpeace goal is to help cleaners make the transition to alternative methods. Greenpeace, according to Mr. Weinberg, is working with the entire fabric care industry, including manufacturers, to change care practices and whatever else has to be changed to move to a time when perchloroethylene



Apparel Care and the Environment

Alternative Technologies and Labeling



Summary of Discussion

Session III (Continued)

and presumably many other organic solvents are no longer a part of clothes cleaning.

Mr. Seitz explained that the Neighborhood Cleaners Association (NCA) is involved in wet cleaning for a number of reasons, including environmental reasons. He explained that they are not convinced that perc is going to be eliminated, but are working towards reduction, an important part of the process. He suggested that the fact perc consumption had decreased a third over the last 10 years speaks well for the industry.

Mr. Seitz explained that the reason for the move toward wet cleaning is not just environmental, but also to satisfy the customer. He repeated a dry cleaning slogan, "dressing casual doesn't mean you have to look like a casualty." He reminded the audience that the dry cleaning industry has been wet cleaning for over 60 years. The big breakthrough is not equipment as much as it is chemistry and technology. There are better detergents, better solvents, better fabric softeners, better fabric finishers, and changing textiles (such as the move towards polyester, which lends itself better to wet cleaning). He suggested that it is up to the NCA to educate their members who in turn will educate the consumer. The NCA, according to Mr. Seitz, is not advocating the use of perc, but at the moment there is nothing better to replace it with. Unless and until that time comes, cleaners will continue to use it with all of the environmental constraints, controls, and requirements.

Margit Machacek from JC Penny's quality assurance center near Dallas noted that at JCPenney they check garments for quality, performance, and the accuracy of the label. The experience problems with low labeling. She suggested that suppliers be encouraged to provide accurate labels. It is not sufficient to educate the consumer without also educating the suppliers. She asked Ms. Vecellio what the current status of care symbols at FTC is. Many suppliers have been saying they can use care symbols without accompanying words as long as they attach information. Is this the case?

Ms. Vecellio replied that currently the FTC requires labels to have words.

Ms. Machacek asked for clarification and Ms. Vecellio explained that it is permissible to have symbols in addition to the words, but words are required. That is the law. Ms. Vecellio explained that the FTC has indicated it will eventually allow the use of symbols without words, which may be confusing Ms. Machacek's suppliers. Ms. Vecellio expects a final FTC decision to be published in the Federal Register this year, but based on the public comments, there probably will be some delay before garments can be sold in stores with only symbols because time is needed for a public education campaign.

Ms. Machacek asked if it was acceptable to the FTC to have a label containing symbols if it was accompanied by something explaining the meaning of the symbols.

Ms. Vecellio replied that it was not acceptable at this time. The permanent care label must have words, but FTC proposed that for some first period, maybe the first year, maybe the first eighteen months that symbols are



Apparel Care and the Environment

Alternative Technologies and Labeling



Summary of Discussion

Session III (Continued)

allowed without words, there should be some additional material like a hang tag explaining these symbols.

Ms. Vecellio also elaborated on Ms. Machacek's earlier comments about low labeling. Under the current law, a garment can be labeled either "dry clean *only*" or indicate that it can be washed. She explained that a garment cannot be labeled "dry clean *only*" if it can be washed because that is an untrue statement and is a violation of the rule. The FTC asked for information on that type of labeling in a Federal Register (FR) notice and some people indicated that the low labeling practice exists. If so, according to Ms. Vecellio, it is a violation of the rule.

Ms. Machacek asked about a scenario in which a label said line dry only. Wouldn't that be a violation of the rule because it could also be machine dryable?

Ms. Vecellio replied no, if it says line dry to avoid shrinkage because the garment might be damaged if it were tumble dried.

Jessica Goodheart of the University of California - Los Angeles (UCLA) Wet Cleaning Demonstration Project, expressed her agreement with earlier comments that it is important to involve the garment and textile industry in the discussion and is happy they participated. She explained that is one reason that they invited the Gap to serve on their advisory committee, along with the President of the Fashion Industry Alliance in Los Angeles, the largest apparel manufacturing center in the country. Ms. Goodheart invited everyone to visit the Los Angeles wet cleaning demonstration site. They have washed more than 9,000 garments in a 100 percent wet clean shop and will be hosting tours through January 1997.

Ms. Goodheart asked if people from the textile and apparel industry feel they understand what wet cleaning is because it is a new technology. There is talk about multi-process wet cleaning, machine wet cleaning, and other new equipment. She also asked if there was any information that would facilitate the industry's adoption of the items being discussed at the seminar.

Ms. Villa responded to Ms. Goodheart's inquiry by explaining that although she has a degree in textile engineering and has a strong understanding of what wet cleaning is, she does not feel that information on wet cleaning has been exchanged adequately between the industries. She suggested that this kind of seminar facilitates full communication and allows others to learn about the textile industry, the way it is configured, the way it works, and how products are transferred down the chain to the consumers.

Dr. Wentz reiterated Ms. Villa's comments about the need to foster communication. He suggested, however, that the dry cleaning industry, a \$60 billion a year industry, is familiar with wet cleaning and understands the variables that affect textiles. He referenced a book that lists over 500 standards that describe the property changes or potential changes of textiles under variable conditions. Mr. Wentz explained that as a Design for the Environment stakeholder committee member and having worked as a member of the professional wet cleaning group that Mr. Weinberg alluded to, his



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Summary of Discussion

Session III (Continued)

objective is to educate all parties. Dr. Wentz also explained that there is a difference between hearing and acting upon information. His objective when putting together the conference was to develop an objective basis for exchanging information between affected industries.

Dr. Wentz also mentioned the activities of the AATCC Committee. At their May 1996 meeting, they had over 30 people participating and he mentioned that it was Ms. Villa who introduced a motion that AATCC participate in the European Wet Cleaning Committee Round Robin Trial and that they participate in the International Activities to the Evolution and the Assessment of Wet Cleaning.

Dr. Charles Riggs of Texas Woman's University expressed his concern that a standard definition for wet cleaning does not currently exist. He suggested that the AATCC and ASTM develop a standardized definition of wet cleaning. Dr. Riggs warned that if people move ahead with new labels before developing a standard definition, everyone will be going in different directions.

Mr. Weinberg continued the discussion of a standard definition because he believes that the point has been reached where it has to occur. He also suggested that there is a lot of discussion about whether wet cleaning is a new or old cleaning method. While the technique may be old, there are new soaps, new machines, new processes, and a new revitalization of something that certainly looks new. Mr. Weinberg suggested that it is something that is significantly different from home laundering and that old wet cleaning methods might not have been. He stated his belief that what needs to occur is a move towards an operational definition of wet cleaning.

John Michener from Millikon pointed out that IFI often gets items into their laboratory that are label "dry clean," but the lab analysis reveals that the garment should have been laundered, it wasn't dry cleanable. All too often people are misusing care labels. Mr. Michener stressed the importance of having the apparel and the textile industries work with ASTM and AATCC as the test procedures are developed so that we can label apparel properly. On mislabeling, Mr. Michener said he did some research for IFI to find out if fabrics and garments originating in the United States had mislabeling problems or if it was mainly an import problem. It turns out that while the United States is about four times better than China in terms of proper labeling, there are some countries that are four times better than the United States. Mr. Michener didn't think the FTC was the place to go to for enforcement of proper labeling. Consumer Reports, Greenpeace, and other organizations probably get more media attention than the FTC. For Ms. Vecellio to do anything, she has to go into court and that's expensive for all concerned including those who have to pay a higher price for clothing as a consequence of the legal cost. He has seen what JC Penney does in the way of testing and they do a pretty good job of enforcement of proper labeling for the products that they sell. They are doing an enforcement job and that's something everyone should be doing. Information about companies that are mislabeling should be publicized.



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On the subject of wet cleaning, Mr. Michener expressed his concern about whether wet cleaning would get clothes as clean as dry cleaning. In the interest of the environment, we have eliminated phosphates, and that has made it more difficult to make effective detergents. Also, we have been dropping the temperature on our water heaters and that makes it more difficult to get our clothes clean. Mr. Michener said that for him, his environment starts with his underwear, and he wants his intimate environment to be clean. The data presented has focused on shrinkage and dye loss and not so much on cleanliness.

Doug Kelly of Boewe-Permac thanked the organizers, speakers, and moderators. He offered Boewe-Permac's assistance, and said he was sure many other manufacturers would be happy to assist with the process of producing proper care labels.

Jenni Cho from the Korean Youth and Community Center stressed the importance of reaching out to the Korean American population because they really are a significant part of the industry. She pointed out that the UCLA Wet Cleaning Demonstration Project is in partnership with Korean Americans. Ms. Cho said her organization is putting together Korean tours and also working on tours in Spanish, as many dry cleaning pressers are of Latino origin. They are trying to also establish a Korean demonstration site in the Los Angeles area. They are producing Korean brochures and flyers and information and would ultimately like to produce a bilingual video on wet cleaning in Korean and English. She noted that Los Angeles has the biggest population of Korean Americans and demonstration sites in other parts of the country might not have the same level of resources. She offered to provide copies of information in Korean that participants could pass on to train dry cleaners. She expressed interest in networking with other organizations in order to reach out to Korean Americans.

Ms. Patton closed the discussion by commenting that they had heard a lot of offers for exchange of information and assistance and asking Jan Connery to begin the final session focusing on the next steps to take.



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Final Summary and Discussion: Development of an Action Plan

Facilitator: Jan Connery,
Eastern Research Group

Summary

We are now at the final session of the roundtable where we are going to talk about developing an action plan. We have a tremendous opportunity with such a broad spectrum of stakeholders together for the first time, so this final session is a very important part of the roundtable. I'm going to start with a summary of the previous sessions and then I'll set forth the framework for the discussion.

During the first session, the theme was the activities that the U.S. Environmental Protection Agency (EPA) has initiated or catalyzed in this area. In particular, we heard about EPA's Design for the Environment (DfE) Program and their partnership for voluntary environmental improvement for the dry cleaning industry. That partnership was formed in 1992. They have made a lot of progress since that time, particularly in exploring the viability of wet cleaning and other alternative processes. Also, they've done extensive outreach concerning wet cleaning and they are working to help eliminate some of the barriers to moving these processes forward. We also heard that the integrated Cleaner Technologies Substitutes Assessment document will be out sometime next year.

From Dr. Riggs and Dr. Grady we heard about an EPA-sponsored research project to evaluate current technology and to identify and screen new technologies. Also, the project will seek to develop a universally accepted procedures to evaluate wet cleaning technologies and will provide input through the American Association of Textile Chemists and Colorists (AATCC) to update care labels.

The subject of the second session was textile care technology developments. We had number of very interesting presentations including some about exciting developments in Europe. Our first speaker was Josef Kurz. He talked about the textile care research in Germany concerning use of water cleaning and organic solvents in carbon dioxide. This research includes efforts to reduce the impact of wet cleaning on textiles and to optimize soil removal. Our next speaker was Manfred Wentz. He gave us a very comprehensive overview of the textile care technology spectra and the care labeling issues. He made three key points: the care labeling instruction should be based on objective rather than subjective criteria; all members of the apparel chain



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should be working together to optimize garment performance as new technologies emerge; and national and international organizations also need to work together. All of these themes were echoed by other participants.

Kaspar Hasenclever talked about professional wet cleaning in Europe. They have found that it provides better cleaning and smell, clearer colors, lower cost, enhanced service capabilities, and full customer satisfaction. Mr. Hasenclever also mentioned that a number of dry cleaners have had increases in their business since adding wet cleaning services to their portfolio. Another benefit of wet cleaning is that it might help catalyze the shift of some of the 90 percent of garments that are currently cleaned in a home to the dry cleaning industry, at least in Europe.

Our next speaker, Walther den Otter talked about the European Wet Cleaning Committee that was established in 1995. He spoke about their Round Robin Trial of two wet cleaning processes and another round robin that is planned for later this year. He stressed that the committee wants to cooperate with the North American institutions in getting an international test method and labeling system established as soon as possible.

Helmut Kruessmann talked about the status of European care labeling. A number of issues have been resolved and a symbol for wet cleaning has been developed. He stressed that more information is needed about what articles can be damaged by the combination of water, detergent, and mechanical action.

Finally, yesterday we heard from Jo Patton about a 1-year demonstration project sponsored by the Center for Neighborhood Technology. It was a wet cleaning-only operation. One of the important results of that project was that they found the use of wet cleaning does not mean that you are simply shifting the air pollution concerns associated with dry cleaning to water pollution concerns. There was pretty much a clean bill of health there. Jo Patton also pointed out that wet cleaning is complex and more information is needed about what fibers and textiles work with wet cleaning.

The third session was about care labeling. We had a very interesting range of perspectives on that issue beginning with the origins of care labeling and comments from the Federal Trade Commission (FTC) and the American Society for Testing and Materials, then working through the textile industry, the apparel industry, the retailers, fabric care specialists, and finally consumers.

Connie Vecellio from the FTC talked about the current care labeling rule and efforts to change that rule, particularly with regard to labeling for wet cleaning. A couple of Federal Register notices have already come out asking for comment and the FTC will publish a notice of proposed rule making soon. Connie encouraged everyone to comment on the notice when it comes out.

Jo Ann Pullen from the American Society for Testing and Materials (ASTM) gave us a "tour" of the ASTM standard for care symbols. There is work to be



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done in harmonizing cleaning symbols with Europe and it sounds like there is the will to make this happen.

Kay Villa from the American Textiles Manufacturing Institute (ATMI) talked about her industry's perspectives on "eco-cleaning" developments. We learned that ATMI supports dual labeling of dry cleaning and "eco-cleaning," if it applies only to items that are normally dry cleaned. She expressed concern about the potential damage claims associated with the use of wet cleaning and stressed the need for more testing. We have heard that theme a lot in the past day and a half. She emphasized particularly that, for her industry, new cleaning methods require a new formulation and this will take time. She also stressed that we need to make sure that we are not solving one environmental problem by creating other problems somewhere up or down the chain.

Carl Priestland talked about the apparel industry's perspective on changes in care labeling. He said the apparel industry has a vested interest in good care labeling and he also stressed that any modification of the care labeling rule requires great care and time for the industry to adjust. He was one of the people that stressed that the U.S. labeling system needs to harmonize with international labeling — that we need one system worldwide.

Jennifer Holderness from the Gap gave us one retailer's perspective. There were a couple of concerns that she noted such as customer confusion regarding care labels and how can we best educate customers.

Our next speaker was Mary Scalco from the International Fabricare Institute. She made a number of very important points. Dry cleaners are on the front lines when there is damage and there is a need to educate dry cleaners about care labeling. She thought the care labeling rule needed to be better enforced and she echoed Manfred Wentz's statement that there needs to be a strengthening of the reasonable basis requirement.

Nancy Cassill gave us some very interesting facts about trends in consumer attitudes and perception related to care labeling. One of the bottom lines was we are going casual in the United States. She encouraged an integrated partnership and particularly recommended that the stakeholders representation in the future be expanded to include converters, importers, and exporters. She noted opportunities in the consumer trends and "eco-cleaning" developments for the fabric care industry. Dr. Cassill particularly recommended listening to consumers and learning from them as a means of maintaining a growing customer base. She also stressed the importance, as did others before her, of educating the consumers about the advantages of wet cleaning especially for casual apparel.

That brings us to this final discussion. First off all, it's striking to me that so much of the important activity that has been mentioned taken place in the past four years or less. It's all very recent and this whole "eco-cleaning" movement has acquired a very strong momentum in a short time. As Manfred Wentz mentioned there has been a paradigm shift and things are moving forward. Another point is, from what I've heard, there appears to be a consensus among the many stakeholders that these developments are good as long



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as the “eco-cleaning” processes are economically viable and acceptable to the consumer. Fabric care is a business and it has to succeed as a business, but as long as some of these environmentally friendly alternatives meet those two criteria everyone agrees this is a good area to move forward on. Also, a number of people have mentioned that it’s a very good thing that broad a spectrum of stakeholders are together. This is the first time that there has been such a broad spectrum working together. As someone recently said “working together will be the solution.” We would like to capitalize on that right now by using this final session to talk about how we might move “eco-cleaning” forward. We have called the session *Development of an Action Plan*. I would like to focus most of the time on an action plan to move things forward and reduce barriers to “eco-cleaning.”

Ohad Jehassi commented that using the phrase “eco-cleaning” to stand for environmentally friendly cleaning alternatives presents some difficulties because “eco-cleaning” used to mean something else a few years ago and eco clean is a registered trademark.

Jan Connery continued, by reiterating that in the final session most of the time will be spent talking about action ideas and then time will be spent talking about the mechanisms to move this forward. This forum has brought stakeholders together and there will be other forums in the future. Perhaps there are other ideas about how stakeholders can continue to work together.

There are a couple of things I would like to note about this session. I would like you to think about this as a brainstorming session. These are preliminary ideas. I hope people will feel free to put their ideas on the table and focus. While we won’t have a time to really fully explore every idea, the point here is to get some ideas on the table so they can be taken forward in other forums. And I would also like everyone to understand that if the idea is put forward that does not commit that person’s organization to following through on it.

We are particularly interested in opportunities and ideas for stakeholders to work together. And we want to be forward looking and action-oriented. Every idea has potential merit and we want to take note of it.



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Discussion

Robert Loop from Paxar Corporation, suggested that a newsletter be published that would focus both on the testing as well as apparel manufacturers.

Ken Adamson of Langley Parisian Limited, mentioned that a number of projects already exist including the Professional Wet Cleaning Partnership (PWCP) and the North Carolina State University (NCSU) and Texas Woman's University (TWU) joint research project.

Dr. Manfred Wentz of R.R. Street & Co. commented on Jan Connery's use of the abbreviation WC to stand for wet cleaning. He pointed out that in Germany WC stands for water closet, or toilet, so that perhaps it would be best to use a different abbreviation.

Mary Scalco with the International Fabricare Institute (IFI), extended IFI's education services to the conference participants, in particular through the PWCP, part of whose goal is education.

Jerry Tew of the American Association of Textile Chemists and Colorists (AATCC), noted that AATCC publishes a newsletter and a monthly magazine called *Textile Chemist and Colorist* (CH) that is goes all over the world. AATCC recently initiated a monthly update on environmental issues that will be included in CH. AATCC would be happy to include information about wet cleaning in those updates.

Bill Seitz of the Neighborhood Cleaners Association International (NCA-I) said that NCA-I has a monthly bulletin that is disseminated world-wide. He said he would be happy to add participants to that mailing list in order to keep them up-to-date with what NCA-I publishes on wet cleaning and dry cleaning. He added that NCA-I has a school, the New York School of Dry Cleaning with a complete wet cleaning facility including the most modern equipment. Mr. Seitz said he would be happy to give interested parties a tour of this facility to give them a better understanding of what the wet cleaning process is. NCA-I also offers wet cleaning courses to teach the dry cleaning industry.

Jack Weinberg proposed that an updated participants list with names and phone numbers and addressees be mailed out to everybody. Mr. Weinberg remarked that he would like the participants to find a way to continue working together based on specific goals that may take some time to define. There are some very specific common goals that a large portion of all the stakeholders can subscribe to and it may be possible to create the framework limited to those goals for ongoing work. He noted that a version of "eco-cleaning" may be such a common goal. Mr. Weinberg expressed his hope that U.S. Environmental Protection Agency (EPA) will be involved enough in the next period to help facilitate exploration of specific goals and changes.

Jody Siegel said she receives *Textile Chemist and Colorist* and is always looking for articles relevant to her work with the environment. She proposed that an



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action item be to publish in *Textile Chemist and Colorist* and any other relevant trade and technical publication. She also suggested that there be an effort to have speakers knowledgeable about wet cleaning and other alternatives speak at forums such as the AATCC international conference and dry cleaning trade shows.

Paula Smith of the Indiana Department of Environmental Management proposed that the first item on the action plan be to develop a definition of wet cleaning. She noted that many of the states including Indiana, Ohio, and Illinois have already developed their own definition of wet cleaning.

Ms. Smith also proposed further educating consumers on wet cleaning. A lot of dry cleaners don't want to advertise how much wet cleaning they do because they are afraid people will stop bringing items to their shops.

Dr. Wentz pointed out that the goal of the joint research project at NCSU and TWU is to develop objective data based on the scientific method rather than on the advocacy method. Dr. Wentz responded to Ms. Seigal's proposal about publications by noting that technical publications such as *Textile Chemist and Colorist* are peer reviewed. This assessment is based on objective evaluation rather than advocacy. Having scientific and research papers peer reviewed lends them credibility. The same review process is often involved at professional meetings.

Mr. Adamson proposed that one action item be to assess the resources already available such as ongoing committees to see if they adequately meet the need for creating sustained dialogue. There has to be a careful assessment of the mechanisms that currently exists and how they might be enhanced and preserved to insure that this dialogue continues.

Me. Weinberg said that he doesn't feel there is a clear distinction between objective science and advocacy. Many of the people on the research project's advisory board have very clear economic interests in certain outcomes and other outcomes are less well represented. He suggested that review processes be opened up to a larger number of stakeholders.

Jo Ann Pullen of the American Society for Testing and Materials (ASTM), pointed out that the United States is different from most other nations with respect to voluntary standards. In other nations, voluntary standards are developed in the private sector. ASTM is made up of producers, users, general interests, and consumers and is a broad forum for developing the standards needed for communication and business. A standard definition for professional wet cleaning that matches AATCC's and is reviewed by ASTM would be an appropriate part of ASTM's work. States are developing their own definitions and should be participating in voluntary standards group to develop a common definition. Ms. Pullen proposed that an action plan goal be that standards are in harmony in Europe, Japan, and North America, so that we are one global voice. She said the way to achieve this is through voluntary standards.



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Kay Villa of the American Textile Manufacturers Institute (ATMI) said that in order for ATMI to move forward with a clear definition of wet cleaning, it would help to have someone from the states coordinate a state position or at least put together some background information on the definitions that exist.

John Michener of Millikon, commented that one way to get information out quickly is by using the World Wide Web. He suggested setting up a web site where a wet cleaning definition could be discussed by a number of participants.

Connie Vecellio of the Federal Trade Commission (FTC), commented that most dry cleaners have not only participate in IFI and NCA-I, but they also have state trade associations with yearly conventions with speakers. She suggested that those conventions would be a great place to have speakers tell dry cleaners about professional wet cleaning.

Ms. Scalco responded that she thinks dry cleaners are well aware of what wet cleaning is. What is new to the dry cleaning industry is machine wet cleaning. IFI, NCA-I, as well as the manufacturers of wet cleaning equipment have been educating dry cleaners about how to use this equipment. What hasn't occurred is that type of outreach and education directed toward the textile and the apparel manufacturers. Although, both AATCC and ASTM have formed wet cleaning committees and are already working on that particular issue.

Ms. Vecellio responded that she had not meant to suggest that dry cleaners don't know about wet cleaning. Ms. Vecellio stressed that what the FTC needs in order to produce a new label for wet cleaning is a definition of what professional wet cleaning is as opposed to washing—a definition for what a professional cleaner can do that someone can't do in their home.

Mr. Seitz commented that almost all conferences held by cleaning industry today have a significant amount of wet cleaning technology being presented to the dry cleaning industry.

Ms. Villa requested that the Center for Neighborhood Technology (CNT) and the University of California-Los Angeles Program provide her with literature, background studies, or information that she could disseminate to ATMI's members.

Ohad Jehassi of EPA, noted that EPA would be publishing and distributing the proceeding of the Apparel Care and the Environment conference which would include participants names and addresses. He also asked for comments on the best way to follow up on the momentum of this conference. He also commented that EPA's role next year is somewhat uncertain as to how active they are going to remain with this project.

Ms. Vecellio commented that, for the purposes of the Care Labeling Rule, FTC need to distinguish between things that can be home laundered and things that could be washed in water but by a professional. If a professional has special knowledge, chemicals, or finishing equipment that a consumer



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wouldn't have, that could be part of the description. It does not necessarily have to include a machine. The key is to make a distinction between home laundering and laundering that has to be done by a professional.

Dr. Wentz observed that a consensus process is used whenever a national or international standard is developed. He indicated that AATCC would be integrating proposed definitions being developed in Europe as consensus is pursued in the United States.

Mr. Weinberg expressed concern that the definition might incorporate all kinds of equipment, which would mean that less things are wet cleanable than if a definition required a certain more sophisticated kind of equipment. He observed that the definition of wet cleaning and how it interfaces with equipment may impact what proportion of clothes will be able to get that label.

Mr. Weinberg encouraged all the people involved in the discussion to participate in the consensus process. He also emphasized how important it is for EPA to continue its support of the wet cleaning project. He observed the meeting had initiated a new dialogue on the issues and noted that there appears to be agreement on the need for changes in clothing care practice driven by environmental and other concerns.

Ms. Seitz agreed with Mr. Weinberg that it is important to continue the dialogue initiated at the meeting. He suggested another roundtable with broadened participation in early in 1997.

Ms. Pullen commented that it is good to consider the state definitions, models for definitions in the FTC rule, and AATCC and ASTM's standard definitions, all of which serve as good models. She indicated that AATCC and ASTM have worked closely together on developing consensus definitions and that will continue to do so with definitions for professional wet cleaning.

Patrick Gouveia of Navy Clothing And Textile Research, urged everyone to contact their corporate leaders, Congressional representatives, and state government officials to provide EPA with the funding to continue the project. He shared that the Navy is involved in discussing a uniform testing project with Dr. Riggs at TWU, using the wet cleaning. Dry cleaning is a concern to the Navy, which is the biggest user of dry cleanable items in the Department of Defense. He indicated that he has already petitioned the Secretary of the Navy for funding to help support the effort.

In her closing summary Jan Connery of Eastern Research Group, Inc., observed that there had been a number of very specific suggestions regarding enhancing communication. She noted a strong will expressed to proceed into the future and to stay in touch and to find other venues to continue working together. She also remarked on suggestions about outreach to dry cleaners and ideas around the need to develop the standard definition for wet cleaning. She thanked everyone for their participation, particularly the speakers.



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Mr. Jehassi thanked the speakers for their excellent presentations and the attendees for their thoughtful questions and comments. He said he appreciated the feedback indicating that the forum had been a positive, open, and honest dialogue. He stated that everyone has a role to play in preventing pollution and expressed his hope that the dialogue that had been started will help move toward the mutual goal of both improving the environment and continuing to satisfy customers needs.