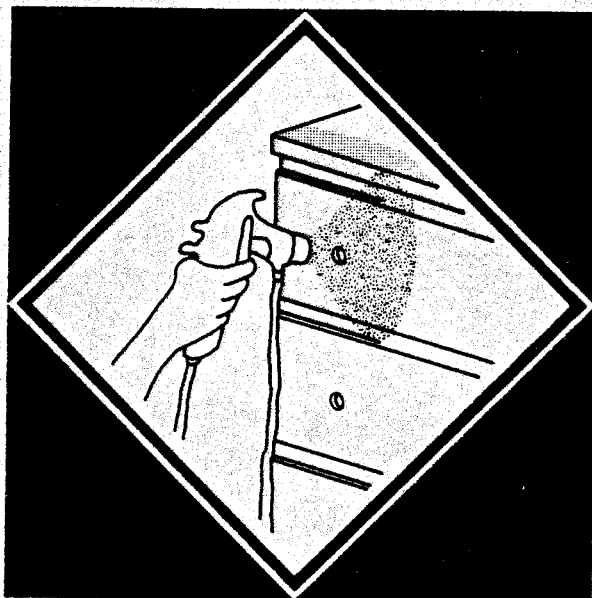


# MANAGING AND RECYCLING SOLVENTS IN THE FURNITURE MANUFACTURING INDUSTRY

October, 1986



Report prepared by Jerome Kohl and Carolyn Ziegler

INDUSTRIAL EXTENSION SERVICE  
**SCHOOL OF ENGINEERING**  
NORTH CAROLINA STATE UNIVERSITY  
RALEIGH, NORTH CAROLINA

Support for this project was provided by  
the North Carolina Board of Science and Technology

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## INTRODUCTION

The objective of the project "Managing and Recycling Solvents in the Furniture Manufacturing Industry" was to reduce the amount of hazardous solvent wastes produced by North Carolina's furniture industry. The project originated in discussions between Jerome Kohl and Terry Pierson, former Director of the Toxic and Hazardous Substance Research program of the North Carolina Board of Science and Technology, and received funding from the same Board. Larry Runyan, Director of Manufacturing Services of the American Furniture Manufacturers Association was very helpful in all stages of the project, especially in suggesting industry representatives who were willing to assist on this project.

Faculty of the North Carolina State University Furniture Manufacturing and Management Curriculum including Thomas Carothers, John Eckwald, and Edward L. Clark played a major role in arranging the workshops, preparing the Manual, and producing the Video Tapes. Phillip Wright and Jeremy Pearson were principal assistants and Carolyn Ziegler and Michelle Rose were research assistants for the project. The video tapes were filmed and edited by the NCSU Humanities Media Center.

Ideas for the organization and content of the project "Managing and Recycling Solvents in the Furniture Manufacturing Industry" were obtained from two advisory committee meetings. The first advisory committee meeting was held during the regular meeting of the AFMA's Energy and Environmental Affairs Committee, and was attended by the following people:

**ADVISORY COMMITTEE MEETING**

**May 22, 1985**

Larry Runyan  
Director of Manufacturing  
Services  
American Furniture Manufacturers  
Association

Jerome Kohl  
Project Director  
NCSU

Alex Teglas  
Stanley Furniture Company

Terry Pierson  
North Carolina Board of  
Science and Technology

William H. Parks  
Drexel Heritage Furnishings

Edward L. Clark  
Furniture Extension  
Specialist  
NCSU

James L. Minter  
Bassett Furniture Industries

Jeremy Pearson  
Research Assistant  
NCSU

Jon K. Parrish  
The Lane Company, Inc.

Howard Miller  
Professor Emeritus of  
Psychology  
NCSU

Ken Wright  
The Lane Company, Inc.

The goal of the second advisory committee meeting was to provide a link of communication and a crossover of ideas between the project organizers and State hazardous waste management officials. Attendees at this second meeting included:

**ADVISORY COMMITTEE MEETING**

**July 23, 1985**

Roger Schecter  
Head, Pollution Prevention  
Pays Program  
Division of Environmental Mgmt.  
NRCD

Gary Hunt  
Pollution Prevention  
Pays Program  
Division of Environmental Mgmt.  
NRCD

Mike Sewell  
Air Quality Section  
Division of Environmental Mgmt.  
NRCD

Jerome Kohl  
NCSU

ADVISORY COMMITTEE MEETING (cont.)

July 23, 1985

William Mills  
Water Quality Section  
Division of Environmental Mgmt.  
NRCD

Edward L. Clark  
Furniture Extension Specialist  
NCSU

Dr. Linda Little  
N.C. Governors Waste Management  
Board

Jeremy Pearson  
NCSU

Emil Breckling  
Division of Health Services  
N.C. Solid and Hazardous Waste  
Management Branch

Philip Wright  
NCSU

Summaries of the discussions of the two advisory committee meetings are included in Appendix A of this report.

Appendix B is a summary of response we received from North Carolina Furniture Manufacturers in response to our questionnaire which sought guidance on the desired content of the workshop and manual.

Appendix C contains the program as presented in Greensboro and Hickory.

Appendix D is a copy of the flyer used to promote the workshops.

Appendix E is the title page and table of contents for the manual.

Initial guidance for this project was provided by Terry Pierson. Final phases of this project were guided by Roger Schecter, and the help of these men is greatly appreciated. The project consisted of two workshops, a manual, and four educational videotapes.

Typing of this Final Report was by Sue Ellis. For more information on any aspect of this program please contact the principal investigator -- address and phone below.

Jerome Kohl  
Senior Extension Specialist  
NCSU  
Box 7908  
Raleigh, NC 27695  
(919) 737-2303

## **WORKSHOPS**

Two workshops titled "Managing and Recycling Solvents in the Furniture Industry" were presented. The first workshop was held on November 20, 1985 in Greensboro, NC, and the second on November 21, 1985, in Hickory, NC. Both workshops included exhibitors.

A mailing list for publicity releases and flyers on the workshops was compiled from: (1) the AFMA's membership list; (2) a list of generators from the Solid and Hazardous Waste Management Branch; and (3) industry contacts provided by Edward L. Clark, Furniture Extension Specialist at NCSU.

The objective of the workshops were to:

1. Provide examples of environmentally sound, economic finishing methods.
2. Provide information, examples and data on incentives so as to motivate furniture manufacturers to upgrade their waste management practices.
3. Provide information on current and upcoming RCRA pretreatment, water quality, and air quality standards.

4. Provide a forum for an exchange of waste management experiences between furniture manufacturers.

The workshops included brief presentations by equipment and coating suppliers and time was set aside for the participants to talk with these exhibitors.

Six case studies were presented to show how process and material changes can reduce generation of solvent waste or improve disposal methods. The case studies included:

1. "Spray Techniques to Reduce VOC Emissions," Ethan Allen Furniture Co.;
2. "Comparison of Solvent Management on the Finishing Line," Steelcase, Inc.;
3. "Experience with Rotary Disc Electrostatic Finishing," Broyhill Industries;
4. "Status of Ecologically Safe Finishes," Reliance Universal;
5. "Experience with Recycling Solvents In-Plant," Boling Company; and
6. "Experience with Solvent/Waste Incineration," Burlington Furniture Company.

Forty-eight people attended the Greensboro workshop, and fifty attended the workshop in Hickory. Each participant was given a copy of the draft manual titled "Managing and Recycling Solvents in the Furniture Industry." The participants filled out course evaluations and critiques of the draft manual.

## FURNITURE MANUAL

A draft version of the manual "Managing and Recycling Solvents in the Furniture Industry" by Jerome Kohl, Philip Wright, Jeremy Pearson, and Michelle Rose was used at the November 1985 workshops. Comments on the draft manual were obtained from the workshop participants and from the members of the American Furniture Manufacturing Association. The draft manual was revised and a final edition completed in May 1986. Appendix E includes the title page and table of contents of the manual. Copies of the manual are available from J. Kohl, the Principal Investigator for this project.

Chapter 1 of the manual presents legal and economic factors to consider when choosing furniture finishing practices. The authors recognized the potential difficulty in changing an industrial process and thus included a section on "Overcoming Resistance to Change."

Chapters 2 and 3 contain technical information on proper spraying practices and a general description of finishing methods used in furniture manufacturing. Throughout these chapters, and the remainder of the manual, are case studies describing process changes implemented by various companies, and the financial and environmental impact of these changes. Each case study includes the name of a person at the company who is willing to discuss his case study.

Chapter 4 covers the "Status of Ecologically Desirable Coatings," including the advantages and disadvantages of water-based and high solids coatings. Chapter 5 discusses how hazardous



waste can be minimized in an industry by using "Good Housekeeping Procedures."

Chapter 6 explains "North Carolina Regulations Governing Waste Solvents." It discusses RCRA, Air Quality, and Water Quality Regulations, and recent changes applicable to hazardous waste generators. Chapter 7 covers "Waste Management Options" and considerations to make when choosing the most desirable option for your company.

The appendices provide information on coating suppliers, coating equipment suppliers, hazardous waste management services, the Pollution Prevention Pays Program, the Piedmont Waste Exchange and specifications of solvents commonly used in the furniture industry.

Five-hundred manuals were printed with the following distribution:

Furniture Manufacturing Dept., NCSU	10
American Furniture Manufacturers Association	150
Pollution Prevention Pays Program	150
Advisory Committees	17
Workshop Participants	98
Individual Requests	75
	<u>500</u>

Edward L. Clark, Furniture Extension Specialist at NCSU, offered the names of furniture industry representatives to consult during the manual's organizational stages in mid-1985. Philip F. Wright, then a senior in the Furniture Manufacturing and Management Program, was the principal student assistant on the manual. Jeremy Pearson, then a graduate student in Civil Engineering, and Michelle Rose, a Humanities Department Coop student, were helpful in compiling and updating information included in the manual.

## VIDEOTAPES

Four instructional videotapes were made\* illustrating various furniture finishing practices. These tapes are intended primarily for use in college-level furniture manufacturing courses, and were produced under the guidance of Dr. John Ekwall, Dr. C. Thomas Culbreth, and Mr. Edward L. Clark of the Furniture Manufacturing and Management Program at North Carolina State University.

The funds used for the production of the videotapes were originally allotted for payment of guest lecturers who were to speak to students in Furniture Manufacturing classes. Approval was obtained from the Board of Science and Technology to make videotapes of the information which the guest lecturers would have presented.

The topics of the four tapes are: (1) Flat Line Finishing Using a Rotary Spray Booth; (2) Flat Line Finishing With a Catalyzed Polyester Finishing Material; (3) Electrostatic Finishing Techniques; and (4) Conventional Finishing Techniques.

The videotapes were produced by Ron Kemp and Ed Williams of North Carolina State University's Humanities Media Services Center. John Eckwald of NCSU's Furniture Manufacturing Curriculum played the major role in selecting shots and editing the tapes which he will use in his classes. Thomas Culbreth and

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\*As of the date of publication of this Final Report two tapes are complete. Final editing is being carried out on the other two tapes.

Edward Clark of Furniture Manufacturing helped locate sites for filming and in the filming. Carolyn Ziegler made contact with furniture companies, arranged filming visits, and worked on scripts to accompany the tapes. Although the furniture companies who permitted videotaping wished to remain anonymous in the videotapes, they are gladly acknowledged here: Steelcase, Inc., Fletcher, NC; Henredon Furniture Industries, Spruce Pines, NC; Bassett Furniture Company, Statesville, NC; Cochrane Furniture Company, Lincolnton, NC; and Dixie Furniture Company, Lexington, NC.

The videotapes are being used in the Furniture Manufacturing Curriculum at NCSU, a set of the tapes will be given to Catawba Valley Technical Institute for use in their furniture curriculum, a third set will be available to representatives of the furniture manufacturing industry through the NCSU Industrial Extension Service.

**APPENDIX A**  
**MANAGING AND RECYCLING SOLVENTS IN THE**  
**FURNITURE MANUFACTURING INDUSTRY**

**Subject:** American Furniture Manufacturing Association, Energy and Environmental Affairs Committee Meeting of May 22, 1985

**Purpose of our Participation:**

Receive Input and Contacts for Possible Furniture Industry Workshops on Solvent Wastes and Other Environmental Issues

Attendees: AFMA

Larry Runyan  
Alex Teglas  
William H. Parks (Bill)  
James L. Minter (Jim)  
Jon K. Parish  
Ken Wright

Visitors:

Jerry Kohl  
Terry Pierson  
Ed Clark  
Howard Miller  
Jeremy Pearson

Discussion:

Comments by Larry Runyan -

- (1) Doug Brackett is Executive Director of AFMA
- (2) AFMA publishes a bi-monthly newsletter in which our workshop could be publicized
- (3) Convenient times for Furniture Workshops: Avoid Furniture Market in High Point October 2-3; Suppliers Trade Show of woodworking and upholstery, in Charlotte, August 1-3; avoid November 13. The best time would be early November, next best is February. But in February are busy preparing for Spring Market.
- (4) People interested in this workshop will include V.P. Mfg., Chief Engineer, V.P. Eng., V.P. Operations, Plant Manager, Finishing Dept. Supervisors.
- (5) Top executives are often sales oriented and not aware of the environmental problems. The strongest motivation for change is the need for environmental compliance.

Comments by Alex Teglas, Stanley Furniture -

Stanley now uses water-wash spray booths where the water is pumped to a holding tank. The tank contents are aerated, in the Virginia plant they are trickled to the POTW sewage treatment plant. In a North Carolina plant the water is collected into a bentonite lined lagoon or hauled to the Greensboro sewage treatment plant. Solvents go to Prillaman for reclaim and are not manifested at this time. Region 4, EPA said their solvents are not a hazardous waste because they are beneficially recycled. But the revised RCRA says that all solvents must be manifested. Stanley has asked EPA for release from need for manifesting.

Solids from the bottom of the surge tank (from spray booths) are taken to the City of Waynesboro Waste Treatment Plant.

Stanley would like to stop using the lagoon, but North Carolina won't give a permanent permit for fill and haul.

Drying oven emissions go out the stack for which they have an air quality permit. There is no solvent recovery.

Solvents are used to clean out finishing pipelines and for cleaning furniture and for removing paint for reworking.

Comments by Bill Parks, Drexel Heritage Furniture -

Drexel Heritage mostly manufacturers case goods. One particular problem they experienced is handling spent detergent from washing rags which was being sent to the sewer. Their POTW now requires treatment of this effluent so they are going to stop washing rags. Rags are used for finishing operations and contain

waste solvents. Bill Sales of Broyhill worked on Pretreatment and is a good contact for this problem.

Drexel uses virtually no water-based coatings; they mainly use nitrocellulose and some urethane, and polyester finishes. Solvents include MEK, MeAC. Their hazardous waste solvents go to Prillaman, solids go to Caldwell-Lenoir (250,000 lbs. last year). Solids include sludges from water wash booths and lacquer dust.

There is no solvent recovery such as carbon adsorption practiced in the painting area.

Furniture manufacturers made a concerted effort to use water-based finishes, but didn't like the looks of the finished products, so dropped the idea a few years ago after they had tried some of the water-based coatings.

Innovative method for possible presentation at the workshop: Drexel now uses high molecular weight plastic coated panels on the water wash booths. The accumulated solids can simply be blown off with air so that there is no need for solvent washes. This coating is not as expensive as teflon.

Comments by James L. Minter, Bassett Furniture -

Innovative method for possible presentation at the workshop: Bassett does do some electrostatic spraying to save paint. This process is useful for furniture with lots of open space such as cribs and chairs. It requires a humidity chamber. Suppliers of equipment are: 1) Ransberg, Indianapolis who sell the revolving disk system and 2) Nordson, Ed Clark has

contact. Mobil sells the finishes. The first installation was so successful that another system was later installed.

Bassett does not use water wash booths because of the water treatment problems. They use baffles and some filters.

Bassett uses mostly conventional guns and some airless guns.

Prillaman recycles some solvents, Caldwell burns some solids, and Oldover burns some solvents (Prillaman's still bottoms are normally sent to Oldover).

PCB-laden transformer disposal is a general and costly problem for the industry.

Comments by Jon K. Parish/Ken Wright, The Lane Company -

Lane has 11 out of 19 plants located in North Carolina, 4 or 5 are in Virginia. All facilities use solvent-based finishes. They have only one water-wall booth and 2 water pan booths company-wide. The rest are dry booths.

Their wastes are sent to Oldover, Seaboard, and Caldwell-Hickory.

Two problems they would like to see addressed at the Workshop are:

(1) Two of their facilities will be covered by the new RCRA amendments. They need training help and more information on the requirements.

(2) New Federal legislation requires monitoring of non-point source discharge from industrial buildings, facilities and parking lots. They need information on requirements.

They are currently using Airless guns on top-coats. They are looking at air-assisted guns. Want more information on High Solids Paints.

#### OTHER PROBLEMS

(1) Sanitary Landfills

Solids sent to sanitary landfills should not contain lacquer dust or liquids. In practice, some is sent to landfills with other solids. Sanitary landfills are generally concerned with reactive and flammable components, and containers that might contain liquids.

(2) Burning Wastes

It would be convenient to allow dry solids from the spray paint booths to be burned in boilers. Bassett was asked to stop burning their waste by air quality personnel. Under what conditions can the industry burn their wastes? What can they burn and what stack testing must they do to burn wastes? We need to talk with Air Quality, NRCD.

(3) Metal Finishes

Lane Company has metal shops in High Point, Royal Development-Metal, makes parts for recliners. They use degreasers, dip tanks, and metal painting in three plants. Other metal furniture companies include: Hoover Universal-Leggett which makes Convert-a-bed.

(4) Permit Status of TSD's

(5) Using Oldover, Caldwell, GS-X

(6) What can customers do to help them get their permits?



## SUMMARY

- Goal date for Workshop -- Early November
- AFMA Endorsement of Workshops Desirable (Larry Runyan to check and give response to J. Kohl)
- Promote Workshops in the AFMA Bimonthly newsletter
- Potential speakers and subjects
  - Bill Parks -- Plastic Coated Panels on Spray Booths
  - James Minter -- Experience with Electrostatic Spray Equipment
  - Bill Sales -- Broyhill Pretreatment
- Topics of Interest:
  - Co-firing wastes in boilers and incinerators. What is permissible? Under what conditions?
  - New RCRA amendment requirements
  - Experience in the use of air-assisted airless spray guns
  - Water based coatings experience
  - POTW Pretreatment requirements
  - New non-point source legislation requirements
- Actions to be taken:
  - Contact James Minter to have tour of electrostatic painting system
  - Contact NRCD, Air Quality office and pretreatment office
  - Find out about non-point source legislation
  - Get document "Surface Coating of Metal Furniture" from EPA-RTP
  - Contact EPA-RTP: Gene W. Smith, David Salman, and Jim Berry

Prepared by: Jeremy Pearson

Comments or corrections to: Jerome Kohl, Senior Extension  
Specialist  
Box 7909, NCSU  
Raleigh, NC 27695-7909  
(919) 737-2303

## APPENDIX A.2

### MANAGING AND RECYCLING SOLVENTS IN THE FURNITURE MANUFACTURING INDUSTRY

Subject: Project coordination committee meeting on July 23, 1985

Purpose: Receive input on possible speakers, contacts for November workshops, receive input on publicizing the workshops

Attendees:	Roger Schechter	Gary Hunt
	Mike Sewell	Ed Clark
	Bill Mills	Jerry Kohl
	Dr. Linda Little	Philip Wright
	Emil Breckling	Jeremy Pearson

#### Discussion:

-- Places and dates for the workshop have been confirmed.

November 20 Greensboro-High Point Marriott

November 21 Catawba Valley Technical College - Hickory

-- Plant visits have been made to Kemp Furniture, Turner Case Goods, and Myrtle Desk. Planned visits (now covered) - Crown Wood Products and Century Furniture

-- Suggestion for workshops - Start program by explaining what changes in regulations are going to be made in an attempt to gain the interest and attention of the attendees.

#### Topic 1 - Regulators to Contact for Possible Speakers

- (1) Arthur Mauberry is in charge of non-point source requirements and permits (Water Quality - NPDES).
- (2) Doug Cook - Region IV EPA - does calculations on solvent emissions.
- (3) Fin Johnson - Chief of Air Quality section - Air toxics program, threshold values for environment.
- (4) Doug Finan - Industrial water pretreatment programs, rules and regulations.
- (5) Jerry Rhodes, William Paige, or Tom Karnoski - revised RCRA regulations - changes for small generators.

Topic 2 - Other People to Contact for Input or Involvement in Workshops

- (1) PPG - wants new regulations that would permit the use of high solids technology.
- (2) Major coatings suppliers - conduct most of the coating research and may be able to supply names of manufacturers who use their products.
- (3) Major equipment suppliers - should have ideas for cleaning up spray booth water and may be able to supply names of manufacturers who use their products.

Topic 3 - Input on Publicizing Workshops

- (1) Linda Little - The Governor's Waste Management Board puts out a bi-monthly newsletter.
- (2) Emil Breckling - has newsletter and can supply labels for generators and small generators.
- (3) Department of Commerce - has list of NC manufacturers by SIC code.
- (4) Buck O'Shields - Wilmington - New Association of Treaters, Stores, and Disposers has a newsletter.
- (5) Equipment and finishing suppliers may be willing to send our flyers with their correspondence.

**APPENDIX B**  
**FURNITURE MANUFACTURERS' QUESTIONNAIRE RESPONSES**

- (1) What type of finishing equipment are you presently using? (Flat line or spray guns/airless, conventional, or electrostatic spraying? Robotics?/Spray booths - wet or dry?) If you use filters in your spray booths, how do you dispose of them?
- Conventional spray gun
  - Uses the conventional type spray gun and spray booth. Blowers and stacks through the roof. Filters are used in filler and glaze booths. This filter is changed two or three times a week, depending on running time. Spent filters are burned.
  - Conventional spray guns/dry spray booths/no filters.
  - Spray guns/airless.
  - Flatline + airless spray guns with wet (water basin) spray booths.
- (2) What are your present solvent waste management practices (Recycling, incineration, off-site treatment or disposal, etc.)?
- Disposal
  - Solvent waste is picked up by Prillaman Co. of Martinsville, VA for off-site disposal.
  - Off-site disposal
  - Off-site treatment - 90%, Incineration - 10%
  - Presently disposing of all spray booth water (with solids) as hazardous waste in off-site treatment area (waste contractor).
- (3) As a waste solvent manager, you must have implemented some practices which have proved beneficial to your waste management programs. Could you identify these? (recycling, new or innovative spraying equipment, high solids content or waste-based coatings, training programs for spray equipment operators)?
- Our waste management program follows a contingency plan based on recommendations of Prillaman and other suppliers and approved by the EPA
  - Training Programs
  - Water-based basecoats + ink are used in flat line system. Plan to filter solids from booth water for solid waste landfill disposal + water by-products to be drained into city sewer.
- (4) Do you have any problems with environmental management of solvents that you would like addressed in the November workshop (VOC's, waste water, Hazardous Wastes, etc.)?

- No
- This session may not touch on the new problems of the use of formaldehyde, but this is the big problem for the moment.
- Hazardous waste disposal review.
- What are some cost effective methods of removing solvents from spray booth water + solids.

## APPENDIX C

### MANAGING AND RECYCLING SOLVENTS IN THE FURNITURE INDUSTRY

#### PROGRAM SCHEDULE

Greensboro, NC  
Hickory, NC

November 20, 1985  
November 21, 1985

8:00 - 8:30 Registration

8:30 - 9:00 Introductions - Discussion of purpose of meeting and manual, Participants introductions and questions

Jerry Kohl, Program Chairman, Senior Extension Specialist, NCSU

Welcome

Larry Runyan, Director of Manufacturing Services, AFMA

9:00 - 10:00 Five minute presentations by Exhibitors on their products and services

Session Chairman, Jeremy Pearson, Graduate Assistant, NCSU

10:00 - 10:30 Break in Exhibit Area

10:30 - 12:30 Case Studies of process changes which reduced solvent wastes or upgraded disposal methods

Session Chairman, Ed Clark, Furniture Extension Specialist, NCSU

"Spray Techniques to Reduce VOC Emissions," Steve Standifer, Plant Manager, Ethan Allen, Old Fort, NC

"Comparison of Solvent Management on the Finishing Line," Robb Holt, Manager of Finishing Services, Steelcase, Inc., Fletcher, NC

"Experience with Rotary Disc Electrostatic Finishing," Jerry Kiser, Broyhill Industries, Lenoir, NC

11:25 - 11:35 Break

"Status of Ecologically Safe Finishes," G.M. Currier, Product Specialist, Reliance Universal, High Point, NC

"Experience with Recycling Solvents In-Plant," Blaney Jennette, Plant Manager, Boling Company, Mt. Olive, NC

# MANAGING AND RECYCLING SOLVENTS IN THE FURNITURE INDUSTRY

## PROGRAM SCHEDULE (continued)

"Experience with Solvent/Waste Incineration,"  
Wayne Kennedy, Environmental Engineer, Burlington  
Furniture, Lexington, NC

12:30 - 1:15 Lunch

1:14 - 1:45 "Overcoming Resistance to Change," Howard Miller,  
Professor Emeritus, Psychology, NCSU

1:45 - 2:15 Visit Exhibitors

2:15 - 3:00 Update on Regulations

Session Chairman, Roger Schecter, Pollution  
Prevention Pays Program, North Carolina  
Department of Natural Resources and Community  
Development

Changes in RCRA Regulations - Effect on Small  
Generators, N.C. Solid and Hazardous Waste Branch

Steve Phibbs, Greensboro  
Keith Masters, Hickory

Changes in Air Quality Regulations, Air Quality  
Section, North Carolina Department of Natural  
Resources and Community Development

Myron Whitley, Greensboro  
Keith Overcash, Hickory

Public and Employee "Right-to-know" Standard,  
North Carolina Department of Labor

3:15 - 3:50 Break in Exhibit Area

3:30 - 4:15 Update on Regulations (continued)

Pretreatment Standards and New Non-Point Source  
Legislation, Doug Finan, Head of Pretreatment,  
Water Quality Section, North Carolina Department  
of Natural Resources and Community Development

Pollution Prevention Pays, Roger Schecter

4:15 - 4:30 Comments and Recommendations for Manual - Philip  
Wright, Senior, FMM Curriculum, NCSU

4:30 - 5:00 Visit Exhibitors

APPENDIX D  
FLYER

**Managing and Recycling  
Solvents in  
the Furniture Industry**

Wednesday,  
**November 20, 1985**  
Greensboro, North Carolina  
&  
Thursday,  
**November 21, 1985**  
Hickory, North Carolina



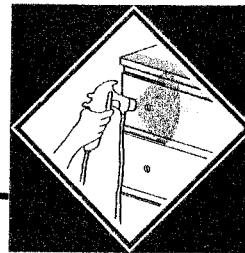
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North Carolina State University**  
and with assistance from  
**The North Carolina Board  
of Science and Technology**  
and  
**The American Furniture  
Manufacturer's Association**

**NORTH CAROLINA STATE UNIVERSITY**  
Division for Lifelong Education  
Box 7401  
Raleigh, NC 27695-7401

ROUTE TO:

- Plant Manager
- Environmental and Safety Engineer
- Finishing Supervisors
- Hazardous Waste Chemist

Nonprofit Organization  
U.S. POSTAGE  
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Raleigh, N.C. 27611  
Permit No. 1010



**Managing and  
Recycling Solvents  
in the Furniture Industry**

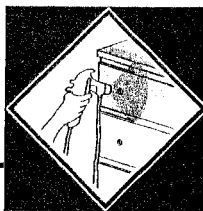
**PROGRAM SCHEDULE**

8:00 - 8:30	Registration	1:15 - 1:30	"Overcoming Howard Mi Psychology,
8:30 - 9:00	Introductions	1:30 - 2:00	Visit Exhibits
9:00 - 10:00	Five minute presentations by Exhibitors	2:00 - 3:00	Update on I Session Chair Pollution Pre NRCD
10:00 - 10:30	Break - Visit Exhibitors		Changes in N.C. Solid a Waste Branch Air Quality North Caroli Natural Resc Developmen
10:30 - 12:30	Case Studies		
	"Spray Techniques to Reduce VOC Emissions" Ethan Allen, Old Fort, NC	3:00 - 3:30	Break
	"Comparison of Solvent Manage- ment on the Finishing Line" Steelcase, Inc., Fletcher, NC	3:30 - 4:15	Pretreatment Non-Point S Water Quali North Caroli Natural Resc Developmen
	"Experience with Rotary Disc Electrostatic Finishing" Broyhill Industries, Lenoir, NC		Pollution Pre Roger Schec
(11:30 - 11:40)	Break	4:15 - 4:30	Comments a for Manual Fill out Evalu
	"Status of Ecologically Safe Finishes" Reliance Universal, High Point, NC		
	"Experience with Recycling Solvents In-Plant" Boling Company, Mt. Olive, NC	4:30 - 5:00	Visit Exhibits
	"Experience with Solvent/Waste Incineration" Burlington Furniture, Lexington, NC		
12:30 - 1:15	Lunch		

For change of address or other mailing instructions, check and return address label with address change to: Division for Lifelong Education, Box 7401, Raleigh, NC 27695-7401.  
 Remove name from mailing list.  
 Send questionnaire for more selective mailing.



APPENDIX D  
FLYER



**Managing and Recycling Solvents in the Furniture Industry**

**Managing and Recycling Solvents in the Furniture Industry**

Wednesday,  
**November 20, 1985**  
Greensboro, North Carolina &  
Thursday,  
**November 21, 1985**  
Hickory, North Carolina



sponsored by  
**School of Engineering  
Industrial Extension Service**  
and in coordination with  
**Division for Lifelong Education  
North Carolina State University**  
and with assistance from  
**The North Carolina Board  
of Science and Technology**  
and  
**The American Furniture  
Manufacturer's Association**

**PROGRAM SCHEDULE**

8:00 - 8:30	Registration	1:15 - 1:30	"Overcoming Resistance to Change" Howard Miller, Professor Emeritus, Psychology, NCSU
8:30 - 9:00	Introductions	1:30 - 2:00	Visit Exhibitors
9:00 - 10:00	Five minute presentations by Exhibitors	2:00 - 3:00	Update on Regulations Session Chairman, Roger Schecter Pollution Prevention Pays Program NRCD
10:00 - 10:30	Break - Visit Exhibitors		Changes in RCRA Regulations N.C. Solid and Hazardous Waste Branch
10:30 - 12:30	Case Studies "Spray Techniques to Reduce VOC Emissions" Ethan Allen, Old Fort, NC "Comparison of Solvent Manage- ment on the Finishing Line" Stockcase, Inc., Fletcher, NC "Experience with Rotary Disc Electrostatic Finishing" Broyhill Industries, Lenoir, NC		Air Quality Regulations North Carolina Department of Natural Resources and Community Development
	(11:30 - 11:40 Break)	3:00 - 3:30	Break
	"Status of Ecologically Safe Finishes" Reliance Universal, High Point, NC "Experience with Recycling Solvents In-Plant" Boling Company, Mt. Olive, NC "Experience with Solvent/Waste Incineration" Burlington Furniture, Lexington, NC	3:30 - 4:15	Pretreatment Standards and New Non-Point Source Legislation Water Quality Section North Carolina Department of Natural Resources and Community Development
12:30 - 1:15	Lunch	4:15 - 4:30	Pollution Prevention Pays Roger Schecter
		4:30 - 5:00	Comments and Recommendations for Manual Fill out Evaluation Form Visit Exhibitors

**NORTH CAROLINA STATE UNIVERSITY**  
Division for Lifelong Education  
Box 7407  
Raleigh, NC 27665-7401

ROUTE TO:

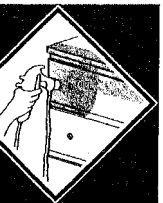
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# Managing and Recycling Solvents in the Furniture Industry

Wednesday  
**November 20, 1985**  
 Greensboro, North Carolina  
 &  
 Thursday  
**November 21, 1985**  
 Hickory, North Carolina

sponsored by  
**School of Engineering  
 Industrial Extension Service**  
 and in cooperation with  
**Division for Lifelong Education  
 North Carolina State University**  
 and with assistance from  
**The North Carolina Board  
 of Science and Technology**  
 and  
**The American Furniture  
 Manufacturer's Association**



## DESCRIPTION

Solvents are widely used in furniture coatings and cleaning solutions. There are many methods of reducing the generation of waste solvents, reducing the volatile organic emissions, and handling the used or waste solvent. Since proper management of waste solvents is important to the Furniture Industry, the North Carolina Board of Science and Technology has funded this workshop and manual which concentrates on the most available technology for improved solvent management in the furniture industry. Representatives of companies selling recycling equipment, recovery equipment, environmentally progressive coatings, and improved cleaning equipment will have exhibits and will be prepared to discuss their offerings. Speakers from the Furniture Industry will share their experience on techniques that help improve management of solvent waste. All participants will be given the opportunity to direct questions to speakers.

## FEE

The registration fee for this one-day program is \$55.00 per participant. This fee includes a copy of the draft manual on "Managing and Recycling Solvents in the Furniture Manufacturing Industry", lunch, and refreshment breaks. Lodging is NOT included in the fee. Please make checks payable to North Carolina State University.

## OBJECTIVES

- Provide examples of environmentally sound, economic finishing methods.
- Provide information, examples and data on incentives to attract furniture manufacturers to upgrade their waste management practices.
- Provide information on current and upcoming RCRA pretreatment, water quality, and air quality standards.
- Provide a forum for an exchange of waste management experience between furniture manufacturers.

## WORKSHOP ORGANIZERS AND SPEAKERS

Key personnel from various furniture manufacturers will be presenting their company's experience with solvent management which will be followed by a short question and answer period.

Organizations that have aided in organizing the workshops include: The North Carolina Board of Science and Technology which is funding the project; The American Furniture Manufacturer's Association; Energy and Environmental Affairs Committee; and NCSU Furniture Manufacturing and Management curriculum faculty.

Mr. Jerome Kuhl, Senior Extension Specialist, NCSU, will be the workshop education leader. Mr. Kuhl teaches a course in Management of Hazardous Chemical and Low Level Radioactive Waste. He has had experience in the management of refinery and chemical plant wastes.

Mr. Edward Clark, Furniture Extension Specialist, North Carolina State University, has played an important role in organizing the workshop.

Research Assistants to Mr. Kuhl who aided in organizing the workshops include: Philip Wright, Sr. RMM curriculum; and Jeremy Peterson, Curricula CE curriculum.

## EXHIBITORS

Equipment and coatings suppliers will be on hand with display and literature and available to answer any questions you may have about their services.

## WHEN AND WHERE

**November 20, 1985, (Wednesday)** 8:00 a.m. - 5:00 p.m.

Greensboro High Point Marriott, Greensboro-High Point Regional Airport, near Interstate 40, Greensboro, NC 27402-6020

**November 21, 1985, (Thursday)** 8:00 a.m. - 5:00 p.m.

Catawba Valley Technical College (CVTC Auditorium), 189 West 64th Street, Hickory, NC 28602-3272

## ACCOMMODATIONS

As indicated, the program scheduled for November 20, 1985 will be held at the Greensboro-High Point Marriott Hotel. The program scheduled for November 21, 1985 will be held at Catawba Valley Technical College. Nearby accommodations to CVTC in Hickory include:

**Holiday Inn Hickory**  
 Hickory 8470  
 (across from the Catawba Mall)  
 (704) 348-7111

**Park Plaza**  
 Interstate 95 Exit 128  
 Enterprise Church Road  
 (704) 465-1128

**Mall Motel**  
 Highway 44-78  
 (1/2 mile from CVTC)  
 (704) 338-2881

When making your reservation, please state that you will be attending this course. Guaranteed late arrival reservations are advisable.

## REGISTRATION

Fill in and return the "Registration Form."

The workshop will be limited in size for maximum effectiveness, and reservations will be accepted in the order they are received. Registration should be made by at least one week before the Program date. The registration fee cannot be refunded when cancellation is made after the week before the Program date, or when a registrant fails to appear. It is therefore the registrant's responsibility to contact the Division for Lifelong Education a week in advance in the event of a cancellation. Substitutions may be made at any time.

## WHO SHOULD ATTEND

This program is recommended for:

- Plant Managers
- Plant Engineers
- Environmental Engineers
- Hazardous Waste Managers
- Finishing Supervisors
- Chemists

## FOR MORE INFORMATION

For more information on program content and objectives contact: Jerome Kuhl, Senior Extension Specialist, Box 799, North Carolina State University, Raleigh, NC 27695-7999. Phone: (919) 735-5281.

For information on registration contact:

Dora Shell, Division for Lifelong Education, Box 740, North Carolina State University, Raleigh, NC 27695-7401. Phone: (919) 735-5281.

## Advance Registration Form\*

MANAGING AND RECYCLING SOLVENTS IN THE FURNITURE INDUSTRY

November 20, 1985 - November 21, 1985

Program Number: 0920

Fee: \$55.00 per person

SOCC REG. NO. 114

NAME (Last)

FRM0920-11-85

CHECK DATE AND LOCATION YOU PLAN TO ATTEND:

November 20, 1985 Greensboro, North Carolina

November 21, 1985 Hickory, North Carolina

Note: Check, plus accompany registration.

Work Phone ( )

Signature

DATE	
NAME (Last)	

**APPENDIX E**

# **Managing and Recycling Solvents in the Furniture Industry**

**May, 1986**



**Prepared by:**

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**Assisted By:**

**Edward Clark, Furniture Extension Specialist**

**Industrial Extension Service**

**School of Engineering**

**North Carolina State University**

**Raleigh, North Carolina**

**Funding Was Provided By The N.C. Board of Science and Technology**

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