Final Report for 1996-1997 Leadership Grant

Building Partnerships through Compliance Assistance and Pollution Prevention to Achieve Environmental Improvement in the Wood Finishing Industry

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December, 1997

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Final Report for the Leadership Grant Building Partnerships through Compliance Assistance and Pollution Prevention to Achieve Environmental Improvement in the Wood Finishing Industry

The Minnesota Pollution Control Agency's Small Business Assistance Program (SBAP) and the Minnesota Technical Assistance Program (MnTAP) received a two year Leadership Grant from EPA in 1995. SBAP and MnTAP used these funds to target wood cabinet manufacturers, wood furniture manufacturers and millwork shops for compliance and pollution prevention assistance. This report summarizes the activities conducted as part of this grant and future efforts that SBAP will be pursuing with the wood finishers.

Targets

The secondary wood products industry is an important industrial sector in Minnesota, both economically and environmentally. Over 1,000 furniture, cabinet and millwork shops operate in the state. Volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) are emitted from the application of stains, paints, sealers and topcoats. The majority of these shops are small and do not generate significant air emissions on their own. However, the combined VOC and HAP emissions are significant.

Minnesota is in attainment with the ambient air quality standard for ozone. The attainment status is not expected to change with the new ozone standard. Voluntary reductions in VOCs are being encouraged to ensure that Minnesota remains in attainment. The wood finishers had not been targeted for compliance assistance by any division within the MPCA in the past. There were also many potential partners to assist with the goals of the outreach efforts.

Demonstration Project

A demonstration project was seen as one method to investigate a number of pollution prevention opportunities and gain hands on information that would benefit other wood finishers. The demonstration project was scheduled to be completed within the first year of the grant. This schedule was overly optimistic and the implementation of the pollution prevention options continues.

Soliciting Companies

The first step in the demonstration project was to find and select a company that would be interested and willing to participate in the project. Flyers soliciting interest in the demonstration project were mailed to 500 wood finishers in February 1996. Articles soliciting interest in the project were also published in the MPCA's Air Mail newsletter and the Minnesota Technical Assistance Program's (MnTAP) Source newsletter. When the flyers did not generate much interest, a list of companies that fit the targeted audience was generated from the Air Quality permit application database. These companies were contacted directly to see if they would be interested in the project. Fourteen companies were visited to review their operations and discuss the demonstration project in February and March of 1996. Second visits were conducted at several facilities.

Selection of a Company

The Pine-Tique Furniture Company, located in Minnetonka, Minnesota, was selected for the pollution prevention demonstration project in April, 1997. The criteria used to select the demonstration company included:

- A project that would be transferable to other wood finishers.
- Support from management for the project.
- Willingness to allow the project to be documented (both as written materials and through a videotape).
- Flexibility in operations to try different pollution prevention options.
- Common type of coating equipment (to ensure that the information from the project would be useful to other wood finishers).
- Size of the facility (preference was given to smaller shops).

A partnership agreement between Pine-Tique, SBAP and MnTAP was signed in May 1996 for the demonstration project. The primary focus at Pine-Tique was to find a water based stain and lacquer whose quality matched their solvent based system. Viking Industries, located in St. Joseph, Minnesota, was also interested in finding a water based finishing system. In order to provide assistance to Viking and gain as much knowledge as possible, MnTAP placed a student from their summer internship program at Viking.

Pine-Tique also had plans to expand their operations so that they could increase their production capacity by fifty percent. Pine-Tique applied for and received a low interest loan from the SBAP to purchase coating equipment that was compatible with the water borne coatings. This included stainless steel filters, pumps, valves, regulators and HVLP (high volume low pressure) spray guns.

Process Considerations

Both Pine-Tique and Viking used traditional solvent based stains and nitrocellulose lacquers to finish their wood products. Stain is sprayed on and wiped off, followed by a sealer and topcoat. Scuff sanding is performed between the sealer and topcoat. Not all products are stained. Some are sold with only a clear coat.

Some differences in the operations of Pine-Tique and Viking that factored into the search for a suitable water borne coating included the following:

- Viking's products are primarily constructed out of pine, while Pine-Tique uses a variety of soft and hard woods. The softwoods are more porous and grain raise with the use of water borne coatings can be more pronounced and difficult to overcome. A smooth even finish to the touch is a standard that most wood furniture manufacturers are trying to achieve.
- Viking has an 8 hour dry time to meet the demand for their products. Pine-Tique is able to dry their products overnight.
- Viking requires a coating that can withstand the cold since they use unheated warehouses and trailers to store their products. Subjecting the finish to different temperature extremes often causes fine grain cracks in the shape of spider webs which creates an unacceptable finish and defective product.

- Viking does not fine sand their product since the resin from the pine builds up too quickly on the finer grit sand paper. This resin build-up results in the sand paper to having to be changed more often increasing sanding costs. The resin build-up can also result in the marring of the wood surface. On the other hand, the rougher surface allows the wood to remain more porous and more susceptible to grain raise.
- Pine-Tique was very interested in staying with their coating supplier since they were satisfied with the availability of their coatings on a short notice.

Project Results

Viking

The intern student sprayed fourteen different water borne topcoats with either their water borne or non-water borne sealers from eleven suppliers on sample boards at Viking. All the straight water borne coatings produced a rough washboard effect on boards with defined growth rings. This also occurred when a finer grit (120) sandpaper was used on the parts.

The intern student also experimented with using a non-water borne sealer with a water borne topcoat. Viking's nitrocellulose sealer did not produce an acceptable finish with any of the water borne topcoats. Two vinyl sealers were also tried with the water borne topcoats. The vinyl sealers worked with several of the water borne topcoats.

Experiments were also done to improve the dry time of the coatings. None of the alternative coatings would work on a consistent basis without Viking adding equipment to improve drying time and improving spray equipment. A more viable option for Viking to consider is a high solids/low VOC coating.

Viking has purchased several new spray guns to apply their coatings. The high volume/low pressure (HVLP) spray gun is used for applying the dark stain. The cost of the HVLP gun was $1,250. It was not possible to estimate the amount of stain reduced by these guns since the stains are wiped off the parts. However, the visible overspray from the staining operation has been greatly reduced.

The sealer is being applied with an air assisted airless spray gun. This spray gun cost $635. The air assisted airless gun is estimated at saving 1,300 gallons of sealer per year. This results in a cost savings of $10,530 per year. VOC emissions are reduced by four tons and HAPs by two tons annually. The actual emissions for VOCs and HAPs in 1995 were 20.7 tons and 11.8 tons respectively.

Pine-Tique

Pine-Tique experimented on pine, walnut, cherry, bird's eye maple, birch and oak sample boards during July and August, 1996. Unlike Viking, Pine-Tique experienced more grain raise on their birch and walnut boards. Pine-Tique sand finishes their boards with a 150 to 180 grit sandpaper which may be part of the reason they did not experience significant grain raise problems on their pine boards. The problem of wood grain raise was overcome by spraying a thinner sealer and topcoat layer and adding a second scuff sanding and topcoating step.

Pine-Tique found that the first water based coating could achieve an acceptable finish on all their woods except for the walnut and cherry. Dyes were added to enhance the quality of the finish, but the clarity and depth of the finish were lost on the darker woods. Pine-Tique did not want to have two different types of coatings in their shop. They switched to a different vendor and have found an acceptable finish for all of their woods. Pine-Tique's supplier is adjusting the formulas to eliminate the need for additional scuff sanding and a topcoating step. The table below summarizes the costs associated with the coatings.

Coating	Cost
Solvent Based Coatings	13 cents per board foot
Water Based Coatings - Extra Sanding/Coating Step	* 26.4 cents per board foot
Water Based Coating - No Additional Steps	14.4 cents per board foot

*The extra sanding and topcoating step increases finishing costs by 25%. This only increases the overall cost of the product by 3 to 4%.

Pine-Tique is quick to point out that cost was not the motivating factor for them to convert to water based coatings. They converted for the following reasons:

1. Converting now allows them to be proactive rather than waiting for a mandate that would restrict the solvents that may be used in the coatings.
2. Water based finishes have fewer worker health and safety issues than solvent based coatings.
3. Water based finishes will help them maintain their "very small quantity generator of hazardous waste" status at the same time they are increasing their production capacity.
4. Allows them to respond to a small but growing market for "green" wood products.
5. Coating vendors are putting more work into formulating the water based finishes. It is possible to have them tailored to their product's requirements.

Pine-Tique's VOC and HAP emissions in 1994 and 1995 were approximately 2.8 tons and 0.28 tons. With the water based coatings the VOC emissions will be approximately 0.55 tons per year and the HAP emissions will be completely eliminated. Wash water will be generated from cleaning the spray equipment, however preliminary tests indicate that the local wastewater treatment plant will allow the material to be sewered.

Other Pollution Prevention Options Identified

Other pollution prevention opportunities that were identified include the following:

- leasing of wipe stain rags from an industrial laundry service
- optimizing the use of the cleaning solvent by implementing a two stage cleaning process
- adjusting the fluid delivery pressure and nozzle size on the spray equipment
- training the operators on the best spray techniques.

Conclusions from the Demonstration Project

The process of finding and converting to alternative coatings takes time. A facility must also be willing to alter their processes to successfully implement an alternative coating system.

Steps which may need to be altered to have the alternative finishes work include:

- Allowing for a longer drying time or investing in equipment that will speed up the drying process.
- Allowing the parts to sit longer rather than be packed quickly for shipment.
- Converting all fittings, hoses and valves to compatible materials.
- Purchasing new spray equipment that has the highest transfer efficiency for the coatings being applied.
- Allowing for time to get all the bugs worked out of the process.
- Training operators on the techniques to properly spray the alternative coatings.
- Finding vendors that are willing to help with troubleshooting problems.

Conversion to alternative coatings and spray equipment that have a higher transfer efficiency can result in significant emission reductions and cost savings. Intangible cost savings also result such as, reduced regulatory burden (moving to a simplified air quality permit, reduced tracking of hazardous wastes and eliminating the need for SARA 313 reporting) and improved worker health and safety. The environment can also benefit from these pollution prevention practices. A copy of the final report from the demonstration program can be found in Attachment 1.

Outreach and Assistance

Site Visits and Enforcement Waiver

Telephone and on-site consultation services are available to wood finishers both from SBAP and MnTAP. Because of the outreach efforts, more wood finishers have requested assistance. The early site visits pointed out the areas of non-compliance (improper storage of hazardous wastes, outdoor storage of materials and the concern with storm water runoff, the lack of holding an air quality permit or holding the wrong type of permit). To encourage wood finishers to comply with environmental regulations, SBAP requested an enforcement waiver from the MPCA for the wood finishers.

The MPCA granted an enforcement waiver to the wood finishers for administrative violations from October, 1996 through April, 1997. Releases to the environment were not covered under the waiver. The MPCA recognized that the compliance initiative would be proactive in providing an incentive for companies to evaluate their operations/wastestreams and take advantage of the available assistance. Assistance continues to be provided to the wood finishers after the waiver period expired, but companies can now face enforcement actions if an inspector finds violations. SBAP staff are part of the MPCA, but do not have regulatory responsibilities or authorities. SBAP has a memorandum of understanding with the Compliance and Enforcement Program on the Air Quality Division that clearly establishes the SBAP staff only report facilities to the Compliance and Enforcement Program in cases where there is an imminent threat to human health or the environment.

The table below summarizes the telephone calls and visits provided to the wood finishers by SBAP and MnTAP staff as part of this grant.

Year	Telephone Calls	Visits
1996	132	61
1997	172	35

Newsletter

A local trade association for the wood finishing industry does not exist in Minnesota. To reach the people within the industry and to keep other state programs and EPA updated on the grant "The Finish Line" newsletter was created by SBAP. The goal of the newsletter is to provide timely and accurate multi-media compliance and pollution prevention information. The first issue was published in September, 1996, and has continued to be published on a quarterly basis. Articles have included basic hazardous waste compliance information, how to determine if you need an air quality permit, pollution prevention success stories, announcements of upcoming environmental training and articles on related issues such as sustainable forestry.

A mailing list of 1,000 companies was generated from data received from the Minnesota Department of Trade and Economic Development and the University of Minnesota's Extension Service. The newsletter has been well received. SBAP and MnTAP received calls for information listed in the newsletter and calls asking that SBAP keep providing information through the newsletter. A copy of a newsletter can be found in Attachment 2.

Self Audit Forms

Minnesota passed a bill establishing a self audit environmental compliance bill in the 1995 legislative session. The MPCA established a comprehensive self audit program, which was piloted on August 1, 1995. Facilities completing the self audit may qualify for the Minnesota Green Star Program. The Green Star is an award to the facility for being proactive in reviewing their operations and taking corrective actions for non-compliant issues. Wood finishers that complete the new checklists can continue to participate in the Green Star Program if they qualify.

The self audit program assumes that the facilities completing the program's checklists have a good knowledge base for completing them. Through our on-site visits and telephone assistance we knew that many of the wood finishers would not be able to complete the self audit forms themselves and that the forms contained a lot of regulatory information that did not apply to them. A decision was made by SBAP to rewrite the hazardous waste and air quality self audit checklists and make them specific to the wood finishers.

The original checklists and rules relating to both the hazardous waste and air quality programs were reviewed. Parts of the regulations that would not apply to the majority of the wood finishers were left off the checklists. The air quality checklist takes a wood finisher through their operations to help them identify air emission sources and determine if they are required to get a permit.

If the need for a permit was discovered the checklist helps them determine what type of permit they should apply for. It also walks permitted facilities through a series of questions so they can determine if they are following the compliance requirements of their permit. The hazardous waste checklist helps people determine if the wastes they generate are hazardous and goes through the storage/manifesting requirements.

Workshops

In the Leadership Grant proposal, a national telecourse was proposed as a means of disseminating the project's results. Because there already was a wood finishing telecourse on September 18, 1996, SBAP and EPA staff felt an alternative to a telecourse was preferable. It was decided that designing a half-day workshop geared to small and medium companies would be useful and would not duplicate efforts. To disseminate the project information, the training materials were shared with other states. The package included all participant and speaker pages for the individual workshop modules, all workshop handouts and a copy of the pollution prevention video produced for the workshop.

Keeping the multi media goal of the project in mind, the training covered a wide variety of topics. It was not possible to discuss issues in-depth with this format, but the training was designed to touch on the main regulatory items that apply to wood finishers and to provide contacts for additional help. A sample agenda was developed with input from people in other media programs at the MPCA and at MnTAP. Seven small companies reviewed the draft agenda and agreed with our approach and the half-day format. A copy of the training materials is available from SBAP. The training topics included:

- Hazardous waste compliance and common problems
- Storm water run-off and proper disposal of industrial wastewater
- Air Quality Registration Permit requirements and compliance
- Emergency Response Commission requirements (SARA Title III)
- Occupational Safety and Health Administration common problems
- Pollution prevention opportunities

The distribution of the wood finisher population throughout the state was used to select training locations so that they were near the concentrations of wood finishers. Six locations in Greater Minnesota and three locations in the Minneapolis-St. Paul metropolitan area were chosen. The Small Business Development Centers (SBDCs) co-sponsored the workshops in their areas. Metropolitan County Hazardous Waste, MPCA Regional Office and MnTAP staff also partnered with SBAP in presenting the workshops. Everyone believed that it was valuable for the businesses to know the people in their county or part of the state whom they could contact for further assistance.

The timing of the training was selected to coincide with the MPCA's Enforcement Waiver for the Wood Finishing Industry. The training sessions were conducted in February and early March 1997 in order to give people time to make corrections to any problems they discovered as a result of what they learned at the workshops. Eighty seven people attended the training sessions.

Videos

Two videos were planned as part of the grant. The first video was produced for the workshops. It consisted of four segments on pollution prevention that covered:

- Proper spray techniques
- Alternative coatings
- Case studies of two companies who have already or are in the process of implementing waste reduction options. Automated Building Components (ABC) switched to water-borne finishes and Crystal Cabinets is working on a variety of options, including new spray equipment.

The second video will document the demonstration project at the Pine-Tique Furniture Company. This video should be completed in March, 1998. Both videos are being filmed, edited and produced in-house by MPCA staff. Copies of the videos can be obtained from SBAP.

Wood Furniture Manufacturing National Emission Standard for Hazardous Air Pollutants (NESHAP)

Fact sheets for both the proposed and final NESHAP were written by SBAP for Minnesota sources. The fact sheets summarized the NESHAP's applicability, the emission limits, work practices, and record keeping. Along with the Air Quality Division's Permit Section, SBAP sent a mailing to approximately 100 wood finishers in July, 1996. The mailing alerted them to the new NESHAP and included initial notification forms.

Only eight facilities in Minnesota are major HAP sources and thus subject to the NESHAP. To assist those companies, a team of professionals in the Air Quality Division wrote a compliance guide for NESHAP facilities. The team was comprised of staff from SBAP, permits, compliance (performance testing and compliance tracking), and enforcement. The compliance guide includes listings of the NESHAP's operating, training, and record keeping requirements, reporting forms, and tracking sheets. The tracking forms were developed by the workgroup to help companies comply with the NESHAP. A flow chart of the Formulation Assessment for Finishing Operations was another tool developed to assist in determining if a company is in compliance with the rule. At the September 18, 1996 telecourse, "Clean Air Compliance for Wood Furniture Manufacturers" sponsored by University of Tennessee and EPA an additional hour after the broadcast was spent discussing the MPCA's compliance guide. The feedback received on the training and compliance guide was positive.

A copy of the NESHAP factsheet and the compliance guide are attached in the Attachment 3.

Partnerships

To avoid duplicating efforts and leverage resources partnerships were used as much as possible. This project also would not have moved forward without the generous help and support from the wood finishers. SBAP and MnTAP wish to acknowledge and thank the following individuals and organizations for their assistance throughout the project:

Brian Savage, Automated Building Components

Angela Ewald and Rose DeGreeff, Crystal Cabinets, Inc.

Victor Krause, University of Minnesota, Duluth - Natural Resource Research Institute

Larry Van Inseghem, Van Technologies, Inc.

Mark Schultz, The Pine-Tique Furniture Company

Viking Industry Staff

MPCA Hazardous Waste Division Staff

MPCA Water Quality Division Staff

Metropolitan County Hazardous Waste Program Staff

Conclusions

Overall, SBAP, MnTAP, our partners and the wood finishers have been pleased with the results of the project. The leadership grant enabled the SBAP to provide more assistance to the wood finishers than would otherwise have been possible. The demonstration project provided valuable information on alternative coatings and spray equipment that can benefit other wood finishers exploring pollution prevention opportunities. The newsletter and workshops allowed us to deliver multi-media information to the wood finishers. The enforcement waiver and the checklists were designed to provide an incentive for the wood finishers to take advantage of the available assistance. The waiver and checklists were not used at a level reflective of the amount of time it took to develop or revise them. We received positive feedback on the newsletter and workshops. We did not receive as much feedback on the waiver or checklists. We also feel that the waiver proved little incentive in this case for companies to examine how the environmental regulations affected their operations and correct non-compliant areas.

The MPCA is moving toward a more holistic multi-media approach in working with industries. This project will help pioneer those efforts by demonstrating how partnerships can be built and multi-media projects can be conducted.

Future Activities

SBAP will continue to assist wood finishers with their compliance concerns. The lack of acceptance of wood products finished with the non-traditional coatings was mentioned by numerous wood finishers as a barrier they faced in switching to the alternative coatings. SBAP has received an additional grant to promote more environmental friendly wood products to the architects, building contractors, cabinet outlets and furniture retailers. This work will be performed in 1998.

MnTAP will continue to help wood finishers with their pollution prevention efforts. They will also be expanding their efforts in refinishing techniques including paint removal.

Partnerships will continue to be a tool that SBAP and MnTAP use to provide assistance and leverage resources.

References

Hill, Koralie, Lowering VOCs in the Wood Finishing Process at Viking Industries, MnTAP Intern Project Final Report, August 1996.

Pagel, Paul and Loida, Barb, Wood Finishing Demonstration Project Final Report, January 1997.

Attachment 1 - Wood Finishing Demonstration Project Final Report

Attachment 1 is available in pdf format on the MPCA web site:
http://www.pca.state.mn.us/air/pubs/sbap-wood.pdf

Attachment 2 - *Finish Line* Newsletter

Attachment 2 is available in pdf format on the MPCA web site:
http://www.pca.state.mn.us/air/pubs/finishline.html

Attachment 3 - Wood Furniture Manufacturing NESHAP Resources

Attachment 3 is available in pdf format on the MPCA web site:
http://www.pca.state.mn.us/air/pubs/woodpio.pdf