



LETTERS TO THE EDITOR

Furniture Strippers Need to Adopt a Pollution Prevention Approach

We were disappointed in our NIOSH colleagues' article "Engineering Controls for Furniture Strippers to Meet the OSHA Methylene Chloride PEL" (*Am. Ind. Hyg. Assoc. J.* 63:326-333 [2002]). The authors failed to make mention of two important facts that are critically important to the control of methylene chloride: (1) the chemical has been designated a Hazardous Air Pollutant (HAP) under the Clean Air Act Amendments; and (2) pollution prevention should be the recommended control. The article includes a picture of a fan attached to a stack that is venting to the ambient environment, but nowhere do the authors mention that such a design could cause the stripper to run afoul of air contaminant standards. Indeed, the final MACT rule for halogenated solvent cleaning requires carbon adsorption controls and recommends against using local exhaust in favor of pollution prevention strategies. Despite methylene chloride's HAP status, the authors did not evaluate the cost or effectiveness of a system that included an air cleaner, a filter maintenance service, or a recycling system. Such a properly-designed system would, of course, be much more expensive than the simple LEV approach presented in the article, and should have steered the authors toward investigating alternative control strategies.

There are pollution prevention alternatives for furniture strippers that reduce exposures to workers and the environment. Some strippers have moved to alternative, less toxic and less volatile substitutes and we are currently conducting research on which ones perform best. Just as industrial hygienists would not appreciate environmental control professionals reporting the solution to the problem of toxic air pollution as shutting up the doors and windows and turning off the ventilation system, neither can we engage in risk shifting.

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Environmental Protection Agency RULES Air pollutants, hazardous; national emission standards: Halogenated solvent cleaning; 61801 Vol. 59 No. 231 Friday, December 2, 1994 p 61801 (Rule) 1/2643 ENVIRONMENTAL PROTECTION AGENCY and 40 CFR Parts 963 [AD-FRL-5111-3] RIN 2060-AC31 National Emission Standards for Hazardous Air Pollutants: Halogenated Solvent Cleaning.

Use of a lip exhaust without any controls, while reducing worker exposure on the one hand, would dramatically increase the overall emissions to the air. Thus, if lip exhausts are used on solvent cleaning machines, the rule requires carbon adsorption controls (which have been added explicitly as a control option in the final rule). Although the lip exhaust-carbon adsorption combination reduces worker exposure and overall emissions to air, it may impose additional cost and burden on sources as well as on the environment for a number of reasons. First, carbon adsorption units are generally more expensive than other controls listed in the options. Second, these units may present cross-media impacts such as effluent discharges if not properly operated and maintained, and spent carbon beds that have to be disposed of as hazardous waste. Thus, when making decisions about what controls to install on halogenated solvent cleaning machines to meet the requirements of this rule, all of these factors should be weighed and pollution prevention measures are encouraged wherever possible.

Note: This rule applies to degreasing and not specifically to furniture stripping.

Authors' reply

We appreciate the insightful discussion from Drs. Roelofs and Ellenbecker concerning our published manuscript. We

would like to take the opportunity to respond to their concerns.

We agree that there are environmental concerns from exhausting methylene chloride (DCM) and that most industries are able to decrease or control through substitute or pollution control devices. The purpose of our manuscript was to show the feasibility of controls to reduce worker exposure. The study provided a model to encourage small furniture stripping shops to install these controls. NIOSH researchers were involved in the issue of pollution monitoring for furniture strippers while conducting a study with the Institute for Research and Technical Assistance (IRTA) and the South Coast Air Quality Management District (SCAQMD) located in the four county area around Los Angeles, California.⁽¹⁾

Furniture stripping establishments are typically very small and the estimated cost of installing the local exhaust ventilation (LEV) recommended in the published report is \$15,000. About 1/3 to 1/2 of those furniture stripping facilities use stripping equipment (stripping or rinsing tanks).⁽²⁾ Of those that use stripping equipment, the annual profit is about \$30,000.⁽²⁾ The estimated number of firms in California which use more than 1200 gallons per year of stripper is 6 (or about 1%) while 420 (or about 85%) use less than 200 gallons per year. The SCAQMD has two rules (1401 and 1402) which require new and existing (respectively) businesses to control their carcinogenic air contaminants to a Maximum Individual Cancer Risk (MICR) of 1 case or 25 cases in a million, respectively. Many furniture stripping facilities are likely to pose a higher MICR. Because there are so many and because they are small businesses, the SCAQMD is developing industry specific controls. One of the control devices they are investigating for furniture stripping is similar to the LEV shown in the published manuscript.

Two types of control devices are available—destruction devices or carbon adsorbers. Destruction devices could include a catalytic oxidizer to decompose DCM into HCl which would be scrubbed with

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NaOH. NaCl formed in the adsorber is classified as a hazardous waste and would have to be handled properly by a licensed hauler. Costs of these systems increase as the flow rate of the ventilation system increases.

Carbonate adsorbers would require the facility to adsorb the DCM and then either desorb it on-site or ship the carbon off-site when it is saturated. Cost for these systems would be at least as much as \$50,000 plus operating costs.⁽³⁾

Environmental concerns are not necessarily increased from exhausting the vapors to the outside versus accumulating the vapors inside the shop. A LEV releases a similar or reduced amount of DCM into the community with less exposure to the worker. SCAQMD compared the MICR at 25 m from the exhaust source using a low-volume LEV and a high-volume (3000 cfm) LEV, which was similar to the one reported in the published manuscript.⁽²⁾ The SCAQMD showed that the low-volume LEV exhausted 19.2 lb/hr of DCM and had a 39.8% capture efficiency while the high-volume LEV exhausted 21.2 lb/hr but had a 89.7% capture efficiency. These results show that the high-volume LEV was able to capture a much higher percentage of the DCM while the DCM emissions increased by only 2 lb/hr. The SCAQMD determined that the MICR at 25 m from the emission source was reduced from 79 to 66 in a million by the switch from low to high-volume LEV, a 17% reduction. Since the LEV system is similar at the site described in the published manuscript, we presume that the ventilation system also reduced the cancer risk for individuals at near receptor sites.

We must admit that the published manuscript was negligent in addressing alternative strippers. Low-methylene chloride (low-DCM) stripping solution is one alternative which appears to have the most potential for use in the industry and could reduce both worker exposures and environmental emissions. One Low-DCM stripper that has been field tested contains 50% methylene chloride and 20 to 30% n-methyl pyrrolidone (NMP) as opposed to up to 85% in typical stripping solution.⁽⁴⁾ Low-DCM stripper appears to be a viable option for the furniture stripping industry. The SCAQMD found that the use of this low-DCM stripper compared to the typical formulation lowered the MICR at 25 m from the source from 66 in a million

to 47 in a million (using the high-volume LEV system).⁽²⁾ The low-DCM stripper is not as effective as the methylene chloride stripper for most applications and would increase the use of NMP which is a reproductive and developmental toxin.

Although DCM has been designated a Hazardous Air Pollutant under the 1990 Clean Air Act amendments,⁽⁵⁾ those EPA National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations do not specifically apply to furniture strippers. However, EPA may establish a Maximum Achievable Control Technology (MACT) for Paint Stripping which would apply to this industry. Regardless of the standards that may be established, these are issues that must be addressed by both industrial hygienists and environmental health professionals. Control of DCM in this industry is a complex issue because the substitution and reduction techniques used for other industries are not readily applied. A synergistic approach with our environmental colleagues may be the best method for achieving this goal.

We thank you for the opportunity to respond to these comments.

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REFERENCES

1. Jones, J.H., C.F. Estill, R.W. Kurimo, R.J. Kovein, D.S. Watkins: In-depth survey report- assisting furniture strippers in reducing the risk from Methylene Chloride formulations as Sunset Strip. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 2001.
2. Wolf, K., and M. Morris: "Investigation of Technologies to Reduce Emissions of Methylene Chloride From Furniture Stripping Operations." Prepared for the California Air Resources Board and the California Environmental Protection Agency under contract number 98-334. Santa Monica, Calif: Institute for Research and Technical Assistance, 2001.
3. Wolf, K.: Personal Communication, July 25, 2002.

4. Benco Sales: Material safety data sheet, Benco #B7 industrial paint remover. Crossville, Tenn.: Benco, June 1, 1999.

5. EPA: 40 CFR 963 National Emissions Standard for Hazardous Air Pollutants: Halogenated Solvent Cleaning, 1994.

More on Trinity

[Editors note: The quoted material appeared in the July/August Letters to the Editor. The numbered items are Mr. St. John's responses to those statements.]

The letter to the editor from Dr. Stanley Music and Dr. Ronald Levine in the July/August issue was an example of pseudo-science.

"The Division of Epidemiology made the initial assessment that people lived very near a facility that used and emitted large volumes of toxic materials, that many of the people living near the facility reported the frequent occurrence of severe health symptoms, and that it was difficult to get the facility to identify their emissions and the identity and concentration of ambient air contaminants."

- (1) If the facility used and emitted large volumes of toxic materials, then there would be no problem in identification. EPA, DEP, SARA inventory, etc., etc. etc.
- (2) If you want to know the concentration of ambient air contaminants you go to #1 above and then do sampling.

"For this reason, a control group was not examined."

- (1) There is no good reason.

... "clinical hyper-reactive airways disease associated with exposure to plant emissions."

- (1) This is not a disease and anyway we were talking about severe health symptoms remember.
- (2) According to the CDC, 26.1 ± 1.9 percent of the adults in North Carolina smoke tobacco. This is very close to the percentage of those diagnosed with clinical hyper-reactive airways disease (28.9%).
- (3) How do they know it was plant emissions that caused the "disease"? No control group and 71% of the exposed group was unaffected.

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Cover photo: Worker replacing gasket. See the article beginning on p. 732 for a study that assessed airborne fiber exposures from intact asbestos-containing gaskets and packings.

Photo by Fred W. Boelter, CIH, PE, Boelter & Yates, Inc., Park Ridge, Ill.

*Cover photos are chosen to represent a variety of workplace scenarios. They do not necessarily reflect proper health and safety practices.