



MOUNT SINAI  
SCHOOL OF  
MEDICINE

## MOUNT SINAI – IRVING J. SELIKOFF CENTER FOR OCCUPATIONAL & ENVIRONMENTAL MEDICINE

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# MDF SAFETY FOR CARPENTERS

**MDF**, or Medium Density Fiberboard, is a type of composite wood product. It is produced from both hardwoods and softwoods broken down into fibers and combined with wax and a resin (glue). It is formed into panels using heat and pressure. Other composite wood products include particleboard and hardwood plywood.

### What is the concern about MDF?

The biggest concern is exposure to formaldehyde gas that is emitted from the product. The glue used in MDF is usually urea formaldehyde (UF). UF is a solid chemical made from a mixture of urea and formaldehyde. Extra formaldehyde may be added to the urea to make a stronger bond. The more extra formaldehyde there is, the more formaldehyde will be trapped in the wood and later emitted as a gas. MDF made with UF may emit formaldehyde gas for months or years after it is manufactured. Over the last few years it has become more common for manufacturers of MDF to:

- Lower the amount of added formaldehyde in the UF resin
- Use alternate glues which emit less formaldehyde, such as melamine formaldehyde or phenol formaldehyde
- Use glues with no added formaldehyde, such as soy, polyvinyl acetate, or methylene diisocyanate

### Formaldehyde: what are the health effects?

Prolonged exposure to formaldehyde can result in cancer, including nasal and sinus cancer and leukemia. These cancers take several years or decades to develop (usually 10-15 years). Working eight hours daily for 40 years at the level of the government standard would give you a risk of about 2 in a thousand for getting cancer\*.

When formaldehyde is present in the air, some individuals may experience adverse effects such as watery eyes; burning sensations in the eyes, nose, and throat; coughing; wheezing; nausea; and skin irritation.

Repeated exposure to formaldehyde may cause bronchitis or skin and asthma-like allergy. Some people are very sensitive to formaldehyde, whereas others have no reaction to the same level of exposure. There is limited evidence that formaldehyde may damage the developing fetus and affect female fertility.



\*Based on the OSHA standard of 0.75 ppm and 1991 USEPA estimates. New USEPA risk estimates are expected by 2012.

### Wood dust: what are the health effects?

Wood dust, especially from hardwood, causes nasal and sinus cancer in woodworkers. Some of the species known to cause cancer include the hardwoods oak, mahogany, beech, walnut, birch, elm and ash. As with formaldehyde, these cancers take years to develop and generally require significant, ongoing exposure for a long period of time.

Wood dust particles tend to settle mostly in the upper airways where they are trapped and can cause eye irritation, nasal dryness or irritation, prolonged colds, nose bleeding and obstruction, sneezing, sinusitis and headaches. Some particles may penetrate deep into the respiratory track causing asthma, chronic bronchitis and hypersensitivity pneumonia.

Skin rash and irritation is the most common health hazard associated with wood dust. It can be caused by abrasion, chemical irritation or by an allergic mechanism known as sensitization. Workers who become sensitized can get more and more sensitive to small amounts of dust over time.

### Urea formaldehyde and other resins: what are the health effects?

Urea formaldehyde is a solid substance that has the potential to cause asthma and skin allergies. The dust from other glues may also have irritating or sensitizing properties. However, there is little documentation on whether sanding or cutting material made from these resins has actually resulted in health effects from the resins, alone.

### What kind of formaldehyde exposures are carpenters expected to get?

Exposures to formaldehyde gas from MDF will vary greatly depending on the amount and effectiveness of ventilation, personal protection (such as respirator use), process (sanding emits more dust than sawing), type of tools (power tools generate more dust than manual tools), type of adhesive (UF is much worse than melamine or phenol-formaldehyde), environmental conditions (high humidity and moisture causes UF to break down into formaldehyde gas), the amount of free formaldehyde in the product, and the amount and hours of the work performed.

Most studies on workers' exposure to formaldehyde from wood paneling have been done in manufacturing plants. We did not find studies of formaldehyde exposures of carpenters working with MDF in the field. Here are some numbers to put exposures in perspective. The effect of ventilation can be seen in a recent study of Federal Emergency Management Agency (FEMA) trailers which found average formaldehyde levels were ten times higher when there was no ventilation: 1.04 (closed up), 0.39 (air conditioned) and 0.09 ppm (windows open).

Formaldehyde Levels (ppm)	Description
0.1	Level expected to cause symptoms in sensitive individuals
0.75	OSHA worker exposure limit
0.01-0.14	Sawing and sanding MDF in ventilated dust chamber
0.19-0.78	Sanding particleboard under laboratory conditions
0.035-0.45	Newly constructed, unoccupied home
Not detectable-0.6	Buildings in which smoking is permitted
0.48-5.31	Indoor air while cooking fish
0.08	Urban background during heavy traffic

## What regulations are there on formaldehyde emissions from MDF?

Despite rumors that MDF is banned in some countries, we did not find this to be so. Japan and the European Union have had MDF emission standards for years.

In 2007, the California Air Resources Board (CARB) issued regulations to cap formaldehyde emissions from composite panels used in finished consumer products. Like most emission standards, they are based on environmental concerns. Most U.S. manufacturers are following the CARB rules. Currently (Phase 1) they limit emissions from MDF to 0.21 ppm inside a special test chamber. By January 1, 2011 (Phase 2), the limit will drop to approximately half that amount (0.11 ppm) in all MDF except thin MDF (such as is used in the backing for laminate flooring). Phase 2 for thin MDF begins in January 2012. CARB also has limits for particleboard and hardwood plywood.

CARB also approves paneling with no added formaldehyde (NAF) and ultra-low emitting formaldehyde (ULEF).

CARB approved paneling and molding must have a product label or stamp. Retail stores should also be able to provide you with a unit label that contains this information. Most US and Canadian manufacturers and some offshore manufacturers are certifying their products sold nationally to comply with CARB. Lumber mills with this certification and fact sheets on their regulation can be viewed on CARB's website: <http://www.arb.ca.gov/toxics/compwood/compwood.htm>.

The USEPA published an Advanced Notice of Proposed Rulemaking on regulating formaldehyde emissions from pressed wood products under the Toxic Substances Control Act (TOSCA), in December 2008. U.S. Senate bill, S 1660, the Formaldehyde Standards for Composite Wood Products Act, would require the USEPA to adopt the CARB regulations nationally, under TOSCA. The USEPA is expected to revise their cancer and non-cancer risk estimates for formaldehyde in 2011.

## What are the best practices for reducing my exposure to dust and formaldehyde from MDF?

- If feasible, use a safer product such as solid wood, composite panels with no added formaldehyde, or products with low formaldehyde emissions. Look for CARB certified MDF boards and molding with NAF, ULEF, Phase 1 or Phase 2 on the label (see above). Products designed for exterior use are likely to emit less formaldehyde, because they are made with moisture resistant phenol-formaldehyde glue.
- Use proper ventilation. The best ventilation, known as local exhaust ventilation, extracts dust and gases at the point of generation. It consists of a hood, duct, fan, filter and exhaust duct. It may be attached to the tool or table. *Remember that filters designed to trap wood dust will not necessarily capture gases, like formaldehyde.* There are exhaust systems that filter wood dust and vent the gas outside. If local exhaust is not available then use good room ventilation.
- Keep dust levels down with good housekeeping. Keep the work area clean so you do not re-suspend dust into the air while working. Never use compressed air to clean the work area or clothing, because it generates dust.
- Use a respirator with cartridges approved for dust and formaldehyde. Respirators should not be used without a full respirator program, which includes training on proper use and fit-testing.
- Good hygiene includes washing whenever you get dirty, and shower and launder clothes at the end of the day.

- Quit smoking. It causes cancer, lung and heart disease. And quitting, even late in life, will reduce your risk.

### What are my rights with regard to MDF?

Occupational Safety and Health Administration (OSHA): The OSHA Formaldehyde Standard requires your employer to conduct air monitoring or have other documentation that shows exposure limits will not be exceeded. Workers' average daily and peak exposure must be below 0.75 parts per million (ppm) and the peak exposure must be below 2 ppm. If greater than 0.1 ppm in the air is expected, then the employer must enforce labeling, education and Material Safety Data Sheet (MSDS) requirements of the OSHA Hazard Communications standard.

OSHA does not have a wood dust or urea formaldehyde standard. OSHA may rely on The American Conference of Governmental and Industrial Hygienists (ACGIH) guidelines for wood dust when evaluating a wood dust hazard. ACGIH recommends average exposure to inhalable wood dust be kept below 1 milligram per cubic meter (mg/m<sup>3</sup>); and half that amount for western red cedar.

You and your union have the right to copies of monitoring results. You have the right to request an MSDS from your employer. You or your union can file an OSHA complaint if you suspect a violation (<http://www.osha.gov/as/opa/worker/complain.html>). A small business employer can request a free consultation from OSHA to evaluate a hazard without the risk of enforcement proceedings (<http://www.osha.gov/dcsp/smallbusiness/consult.html>).

National Institute for Occupational Safety and Health (NIOSH): You, your employer, or your union have the right to request an evaluation of your workplace if people are exposed to a combination of exposures that are not all regulated by OSHA (see <http://www.cdc.gov/niosh/hhe/HHEprogram.html>).

### Where Can I Get Treatment or More Information?

If you think you may be suffering from overexposure to chemicals, construction dust or any work-related illness or injury, contact an occupational health clinic in your area to request an evaluation (see <http://www.aoec.org/directory.htm>). They can also help you obtain more information on workplace health and safety. The Mount Sinai-IJ Selikoff Center has three clinics in the New York metropolitan area and adjacent counties (see below).

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## **MOUNT SINAI – IRVING J. SELIKOFF CENTER FOR OCCUPATIONAL & ENVIRONMENTAL MEDICINE**

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