Minnesota Department of Health Fact Sheet April 2010

Volatile Organic Compounds (VOCs) in Your Home

What are VOCs?

Volatile Organic Compounds (VOCs) are a large group of carbon-based chemicals that easily evaporate at room temperature. While most people can smell high levels of some VOCs, other VOCs have no odor. Odor does not indicate the level of risk from inhalation of this group of chemicals. There are thousands of different VOCs produced and used in our daily lives. Some common examples include:

- Acetone
- Benzene
- Ethylene glycol
- Formaldehyde
- Methylene chloride
- Perchloroethylene
- Toluene
- Xylene
- 1,3-butadiene

Where do VOCs come from?

Many products we have in our homes release or "off-gas" VOCs. Some examples of sources of VOCs are:

- Building Materials
  - Carpets and adhesives
  - Composite wood products
  - Paints
  - Sealing caulks
  - Solvents
  - Upholstery fabrics
  - Varnishes
  - Vinyl Floors
- Home and Personal Care Products
  - Air fresheners
  - Air cleaners that produce ozone
  - Cleaning and disinfecting chemicals
  - Cosmetics
  - Fuel oil, gasoline
  - Moth balls
  - Vehicle exhaust running a car in an attached garage
- Behaviors
  - Cooking
  - Drycleaning
  - Hobbies
  - Newspapers
  - Non-electric space heaters
  - Photocopiers
  - Smoking
  - Stored paints and chemicals
  - Wood burning stoves

Studies have shown that the level of VOCs indoors is generally two to five times higher than the level of VOC's outdoors. VOC concentrations in indoor air depend on many factors, including the:

- Amount of VOCs in a product;
- Rate at which the VOCs are released;
- Volume of the air in the room/building;
- Ventilation rate or the area; and
- Outdoor concentrations of VOCs.

What are the health effects of VOC exposure?

The risk of health effects from inhaling any chemical depends on how much is in the air, how long and how often a person breathes it in. Scientists look at short-term (acute) exposures as hours to days or long-term (chronic) exposures as years to even lifetime.

Breathing low levels of VOCs for long periods of time may increase some people's risk of health problems. Several studies suggest that exposure to VOCs may make symptoms worse in people who have asthma or are particularly sensitive to chemicals. *These are much different exposures than occupational exposures to VOCs.*

VOCs refer to a group of chemicals. Each chemical has its own toxicity and potential for causing different health effects. Common symptoms of exposure to VOCs include:

MINNESOTA MDH DEPARTMENT OF HEALTH

Indoor Air Unit
P.O. Box 64975
St, Paul, MN, 55164-0975
651-201-4601 or 800-798-9050
www.health.state.mn.us/divs/eh/air

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Short-Term (Acute) to high levels of VOCs

- Eye, nose and throat irritation
- Headaches
- Nausea / Vomiting
- Dizziness
- Worsening of asthma symptoms

Long-Term (Chronic) to high levels of VOCs
Increased risk of:

- Cancer
- Liver damage
- Kidney damage
- Central Nervous System damage

What level of VOCs is safe?

The best health protection measure is to limit your exposure to products and materials that contain VOCs when possible. If you think you may be having health problems caused by VOCs, try reducing levels in your home. If symptoms persist, consult with your doctor to rule out other serious health conditions that may have similar symptoms.

MDH has established Health Risk Values (HRVs) for some individual VOCs. HRVs are "concentrations of chemicals or defined mixtures of chemicals emitted to air that are unlikely to pose a significant risk of harmful effects when humans are exposed to those concentrations over a specified time."

For more information on these HRVs go to the MDH Health Risk Values Website at: http://www.health.state.mn.us/divs/eh/risk/rules/air/index.html

Also check the Household Products Database at: http://householdproducts.nlm.nih.gov/cgi-bin/household/list?tbl=TblChemicals&alpha=A

Most health related studies have been conducted on single chemicals. Less is known about the health effects of exposure to combinations of chemicals. Because the toxicity of a VOC varies for each individual chemical, there are no Minnesota or federal health-based standards for VOCs as a group.

Are some people at greater risk from VOC exposure than others?

Persons with respiratory problems such as asthma, young children, elderly, and persons with heightened sensitivity to chemicals may be more susceptible to irritation and illness from VOCs.

What can I do about VOCs that are in my home?

Although home screening kits (devices) are available to measure total volatile organic compound (TVOC) levels they are of limited use and won't correct a VOC problem. Instead of testing, the first step is to conduct an inspection of your home for the common sources of VOCs. Sources that may be problematic include household furnishings which tend to off-gas more VOC's when they are new. Possible sources include carpet, furniture, paint, plastics or electronic devices.

Once you determine the probable source(s) of VOCs, steps can be taken to reduce your exposure. If you are unable to determine probable sources, a professional indoor air quality investigator or an industrial hygienist can be consulted. MDH has developed a guidance document on how to select an indoor air quality consultant. http://www.health.state.mn.us/divs/eh/indoorair/iaqserviceprovider.pdf

How do I reduce the levels of VOCs in my home?

The most effective action is to remove the product that gives off VOCs. Most products containing VOCs will off-gas within a short period of time, although some will continue to give off VOCs for a longer period of time.

Some steps you can take to reduce your exposure to VOCs in the home are:

1. Source control: Remove or reduce the number of products in your home that give off VOCs. Only purchase amounts of chemicals that you know you will use and carefully follow directions on product labels. Remove unused chemicals from the home because stored chemicals in closed containers can sometimes "leak" and release VOCs into indoor air. Check with the city or county for household hazardous waste collection sites. http://www.pca.state.mn.us/waste/hhw/index.html

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For new items consider purchasing:

- floor models that have been allowed to off-gas in the store
- solid wood items with low emitting finishes
- new products that contain low or no VOCs (environmentally preferable products)

As a last resort, airtight sealers have been used to minimize VOC emissions. Check with vendors of composite wood products to choose a non-toxic sealant to reduce exposure to VOCs.

2. Ventilation and climate control can be used to reduce exposure to VOCs.
   - Increase ventilation by opening doors and windows, use fans, maximize air brought in from outside;
   - Keep both the temperature and relative humidity as low as possible or comfortable. Chemicals will off-gas more under warmer conditions with high humidity; and
   - If you have a choice, perform renovations when home is unoccupied or during seasons that will allow for additional ventilation.

In summary, the most effective way to limit VOCs indoors is to limit the potential sources of VOCs. Increasing the amount of outdoor “fresh air” into a space can also dilute and reduce VOC levels.

For site specific vapor intrusion issues, call
Minnesota Department of Health,
Site Assessment & Consultation Unit at:
(651) 201-4899.

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