In this series related to air quality, this issue of Health and Safety News highlights chemicals and odors. The information comes directly from the Centers for Disease Control and Prevention (CDC) website http://www.cdc.gov/ and is found under the Indoor Environmental Quality heading. The web address that contains the information below is http://www.cdc.gov/niosh/topics/indoorenv/chemicalsodors.html and to read more about information that appears in blue, simply right click the mouse and select Open Hyperlink.

INDOOR ENVIRONMENTAL QUALITY

Chemicals and Odors

Chemicals and related odors can be sources of indoor environmental quality (IEQ) problems in buildings. Odors are organic or inorganic compounds and can be both pleasant and unpleasant. Some odors can be health hazards and some are not. While most chemical contaminants originate from within the building, chemicals can be drawn into a building from the outdoors as well.

Reducing exposure to chemicals in the workplace is a preventative action that can lead to improved outcomes for both worker health and the environment.
Chemical Contaminant Sources

There are a variety of chemical contaminants found in a variety of sources. Volatile organic compounds (VOCs) are common chemical contaminants found in office and home environments and are a source of odors. VOCs are organic (containing carbon) chemicals that can easily evaporate into the air. Many products found in the office environment may have the potential to release VOCs. Examples include:

- Caulks, sealants, and coatings
- Adhesives
- Paints, varnishes and/or stains
- Wall coverings
- Cleaning agents
- Fuels and combustion products
- Carpeting
- Vinyl flooring
- Fabric materials & furnishings
- Air fresheners and other scented products
- Personal products of employees like perfume, shampoos, etc.

If these and other chemical contaminant sources are not controlled, indoor environmental quality problems can arise, even if the building’s ventilation system is properly designed and well maintained. Some examples of building related chemicals, odors, and their sources are listed below:

Contaminated outdoor air
- General air pollutants (oxides of sulfur and nitrogen, ozone, others)
- General vehicle exhaust (carbon monoxide, oxides of nitrogen)
- Exhaust from gasoline and/or diesel powered vehicles on nearby roads or in parking lots, or garages (carbon monoxide, oxides of nitrogen)
- Odors from dumpsters
- Exhaust from neighboring buildings (VOCs and odors)
- Unsanitary debris near the building’s outdoor air intake (various odors)

**Soil emissions**

- Radon (odorless and not visible)
- Leakage from underground fuel tanks (gasoline or solvent odors)
- Contaminants from previous uses of the site (e.g., methane)
- Pesticides

**Building emissions**

**Indoor**

- Bioaerosols from water damage, microbial VOCs (VOCs from fungi)
- Emissions from office equipment (VOCs, ozone)
- Emissions from stored supplies (solvents, toners, ammonia, chlorine)
- Emissions from building carpet, furnishings, and other building components (VOCs including formaldehyde from glues, fabric treatments, stains and varnishes)
- Emissions from special use areas within the building such as laboratories, print shops, art rooms, smoking lounges, beauty salons, food preparation areas, and others (various chemicals and related odors)
- Emissions from indoor construction activities (VOCs from use of paint, caulk, adhesives, and other products)
- Elevator motors and other building mechanical systems (solvents and other chemicals)
- Plumbing problems (sewer odors, improper bathroom ventilation)
- Emissions from housekeeping / cleaning activities (ammonia, chlorine, and other cleaning agents such as detergent, dust residual from carpet shampoo, and disinfectants)
- Use of deodorizers and fragrances
- Emissions from pesticide use inside the building
- Accidental events such as spills inside the building
- Emissions from stored trash inside the building
- Fire damage inside the building (soot, polychlorinated biphenyls from electrical equipment, odors)

Outdoor

- Loading docks (vehicle exhausts, chemical spills)
- Emissions from pesticide use outside the building
- Emissions from outdoor construction activities (VOCs from roofing chemicals, and other products)
- Accidental events such as spills outside the building
- Fire damage outside the building
Emissions from building occupants

Potentially hazardous

- Smoking (prohibited on the University of Arkansas campus)
- Cooking odors
- Cosmetic odors
- Increased levels of carbon dioxide

Unpleasant

- Body odor

Related Health Symptoms

While some chemicals found in the workplace may have little effect on workers’ health, others may cause health problems. The presence of odor can cause people to suspect exposures to be harmful to their health. However, with few exceptions, chemical concentrations observed in the office work environment generally fall well below the occupational standards or recommended exposure limits used for industrial settings. Additionally, the presence of odors in a building does not always mean that there is an overexposure to chemicals by these existing occupational exposure standards. Some chemicals have very low odor thresholds, which means you can smell them at very low levels.

The degree to which a chemical exposure can affect health depends on:

- how much of the chemical is present in the building / building air
- how often a person comes into contact with the chemical
- how harmful the chemical is to human health
- how sensitive a person is to the chemical

Common symptoms reported by occupants in the building environment include:

- Itchy, watery, or burning eyes
- Skin irritations or rashes
- Nose and throat irritation
- Nausea
- Headache
- Dizziness
- Fatigue

While chemical concentrations are typically observed at low levels, severe symptoms are possible under extreme conditions. Severe symptoms include kidney and liver damage, and damage to the central nervous system.

What workers can do

When workers suspect their health problems are caused by chemicals in their work areas, workers should:
• Report their concerns immediately to supervisors or those persons responsible for building safety and health or maintenance.
• If necessary, see their doctor or health care provider.
• Avoid the use of air fresheners and room deodorizers. These can cause eye, nose, and throat irritation.
• Properly store all foods and dispose of trash promptly to prevent odors.

What management and building owners can do

When workers suspect their health problems are caused by exposure to chemicals in their work environment, owners and managers should:

• Always respond when occupant health concerns are reported.
  • Establish clear procedures for recording and responding to IEQ complaints to ensure an adequate and timely response.
    ▪ Log all complaints or problem reports.
    ▪ Collect information about each complaint.
    ▪ Ensure confidentiality.
    ▪ Determine a plan for response.
    ▪ Identify appropriate resources for response.
    ▪ Apply remedial action.
    ▪ Provide feedback to building occupants regarding the complaint and response actions.
    ▪ Follow-up to ensure that remedial action has been effective.
• Identify and repair all areas of water incursion.
• Schedule building renovation projects after work hours or when the building is unoccupied.
  ▪ Open windows or increase ventilation to dilute chemical odors.
• Ask your product suppliers for information on chemical emissions and potential health hazards.
• Choose products that emit low or no VOCs when choosing new or replacement carpets, flooring, office furniture, and paints.
• Choose low VOC emitting cleaners.
• Ensure that the manufacturer’s instructions for the use of all cleaning products are followed.
  ▪ Dilute products to the recommended strength before using.
  ▪ Prohibit mixing of cleaning products.
• Properly store cleaning and maintenance chemicals with containers closed and tightly sealed.
  ▪ Do not store chemical products in equipment rooms where they could contaminate the heating, ventilation, and air-conditioning (HVAC) system.
• Provide proper ventilation and maintain the HVAC systems.
• Apply pesticides only when the building is unoccupied. Follow the integrated pest management (IPM) system to prevent risks of exposure.
  ▪ Further information for pest control can be found at the Environmental Protection Agency’s website.

You can learn more about potentially hazardous housekeeping or maintenance products by requesting a copy of the material safety data sheet (MSDS). The MSDS contains complete information about a product, including all safety precautions. Request a copy by calling the manufacturer’s number on the product.
Resources

ATSDR Environmental Odors

Environmental Protection Agency - An Introduction to Indoor Air Quality - Volatile Organic Compounds (VOCs)

Agency for Toxic Substances and Disease Registry - Toxic Substances Portal - Volatile Organic Compounds

The Environmental Law Institute (ELI) - State-based laws and regulations

ELI - Topics in School Environmental Health

Lawrence Berkeley National Laboratory - Indoor Air Quality Scientific Findings Resource Bank - Indoor Volatile Organic Compounds (VOCs) and Health

Occupational Safety and Health Administration (OSHA) - Chemical Reactivity Hazards

OSHA - Solutions: Chemical Exposures

OSHA - Hazardous and Toxic Substances

Reference

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FYI…Information to keep in mind…

Beware of ozone generators! Check the included links for details.

http://www.epa.gov/iaq/pubs/ozonegen.html
