Office of Compliance

fast facts

advancing safety, health, and workplace rights in the legislative branch

Indoor Air Quality: Air Pollutants

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Indoor air quality is not a simple, easily defined concept like a wobbly desk or a leaky faucet. It is a constantly changing interaction of complex factors that affect the types, levels, and importance of pollutants in indoor environments. These factors include: sources of pollutants or odors; design, maintenance and operation of building ventilation systems; moisture and humidity; and occupant perceptions and susceptibilities. These and many other factors affect comfort or perception of indoor air quality.

Pollutants can be generated by outdoor or indoor sources, including building maintenance activities, pest control, housekeeping, renovation or remodeling, new furnishings or finishes, and building occupant activities. One important goal of an indoor air quality program is to minimize people's exposure to pollutants from these sources. Some of the key pollutant categories include biological contaminants, chemical pollutants, and particles.

Biological contaminants

Figure 1: Dust Mite

Excessive concentrations of bacteria, viruses, fungi (including molds), dust mite allergen, animal dander, and pollen may result from inadequate maintenance and housekeeping, water spills, and inadequate humidity control leading to moisture condensation on surfaces. Dust mites, like the one in Figure 1, can cause reactions in individuals prone to allergic reactions. These organisms are introduced into the building by occupants, infiltration, or ventilation air. Allergic responses to indoor biological pollutant exposures cause symptoms in allergic individuals and also play a key role in triggering asthma episodes for an estimated 15 million Americans.

Chemical pollutants

Figure 2: Cleaning Chemicals

Sources of chemical pollutants include tobacco smoke, emissions from products used in constructing and furnishing a building (e.g., office equipment; furniture, wall and floor coverings; and cleaning and consumer products), accidental spill of chemicals, and gaseous products of combustion such as carbon monoxide and nitrogen dioxide. Cleaning products, like those seen in Figure 2, can become pollutants if spilled or not stored properly.

Particles

Figure 3: Particulates from Copier

Particles are solid or liquid substances that are light enough to be suspended in the air; the largest of which may be visible floating in sunbeams. However, smaller particles that you cannot see are likely to be more harmful to ones health. Particles of dust, dirt, or other substances may be drawn into a building from outside, but can also be produced by activities that occur in buildings. These activities include sanding wood or drywall; utilizing office reproduction equipment used for printing, copying and faxing, as seen if Figure 3; and operating other types of equipment.

Signs and Symptoms

Many different factors influence how indoor air pollutants affect occupants. Some pollutants, like radon, are of concern because exposure to moderate levels of the pollutant over long periods of time increases the risk of serious, life threatening illnesses, such as lung cancer. Other contaminants, such as carbon monoxide at very high levels, can cause death within minutes. Some pollutants can cause both short and long term health problems. Prolonged exposure to environmental tobacco smoke can cause lung cancer, and short term exposures can result in irritation and significant respiratory problems for some people, particularly young children.

People often react very differently when exposed to the same contaminants at similar concentrations. For example, some people develop severe allergic reactions to biological contaminants to which other people will not react. Similarly, exposure to very low levels of chemicals may be irritating to some people but not others. For people with asthma and other pre-existing conditions, exposure to irritants like gases or particles from various indoor sources may cause more severe reactions than the same exposure would in others.

Management of Pollutant Sources

Figure 4: Improper Storage in Air Handing Room

Avoid procedures and products that can cause problems. Many common products used in offices including solvents, adhesives, cleaners, and pesticides can produce pollutants and odors. These products should always be used in a well-ventilated area. As seen in Figure 4, improperly storing materials in rooms that ventilate the air, can cause those particles and odors to be released in the ventilation system. Office equipment such as copiers, printers, and fax machines also require the provision of adequate and sometimes separate ventilation. If your organization engages in activities that may generate air pollutants, such as photographic development or large scale printing processes, the provision of local exhaust ventilation for the equipment or process is especially important. Pollutants and odors (which may or may not indicate a health concern) generated in your space may not only bother those in the immediate area, but may enter the building ventilation system and cause problems for employees in other parts of the building.

Figure 5: Preventative Maintenance is Essential

Work with building management and contractors *before* you conduct remodeling or renovation activities to identify low emission processes and equipment. If air emissions are still likely, building management and the contractor must develop and install systems to remove these emissions from the work area and the building. During construction, properly isolating the area to be remodeled or renovated from other spaces, sealing the HVAC systems, and scheduling these activities for evenings and weekends if possible, can go a long way toward minimizing occupant exposures.

If the renovation work is contracted through you, ensure that the architect or interior designer and contractor will use practices and procedures that allow building products to emit vapors and gases before they are installed. If possible, try to arrange for plastic wrappings to be removed from partitions, carpet rolls, and other new materials before they are brought into the space. Ask to have the materials aired out in a clean, dry location outside the building for a few days before installation. This precaution can significantly reduce chemical emissions and odors inside the building.

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23 million Americans have asthma; 12 million Americans had an asthma attack in 2008. A large number of those attacks were in response to exposure to indoor airborne allergens.

In 1988, the Building Owners and Managers Association conducted a survey of property managers to determine the reason why tenants moved to new facilities at the end of their lease. The survey results revealed that 30% of the tenants indicated unresolved HVAC or indoor air quality issues as the reason for their move.

The United States Environmental Protection Agency found that the airborne concentrations of about a dozen common volatile organic pollutants were 2 to 5 times higher inside buildings than outside.

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