

# Indoor Environmental Quality Residential

Industrial Hygiene

IAQ/Mold Assessments

Water Loss Projects

Restoration Project Mgmt

Post Remediation Testing

Building Science

Asbestos Surveys

Lead Inspections

Bacteria Testing

Allergen Sampling

Heavy Metals

Pesticide Testing

Volatile Organic Compound Analysis

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LEED Testing

# Introduction

Indoor environments are where people spend most of their time. Studies have shown that people spend approximately 90% of their time indoors, the majority of that being in their own homes. For many people, the risks to health may be greater due to exposure to air pollution indoors than outdoors. Most people do not know their homes can cause a threat or risk to their health. Over time poor indoor environmental quality can play a significant role in the deterioration of a resident’s health or the health of their family.

The Environmental Protection Agency (E.P.A.) has stated that indoor environments may be anywhere from 2-5 or even up to 100 times more polluted than that of the outdoor environment relating to air quality. Homes may contain biological pollutants (mold, bacteria and allergens) or non-biological pollutants (chemicals from furnishings, cleaning products, combustion particles).

The purpose of this ebook is to discuss the different types of indoor contaminants that are commonly found indoors.



# Volatile Organic Compounds

As stated by the Environmental Protection Agency, “volatile organic compounds (VOCs) are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors. VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings.

The ability of organic chemicals to cause health effects varies greatly from those that are highly toxic, to those with no known health effect. As with other pollutants, the extent and nature of the health effect will depend on many factors including level of exposure and length of time exposed. Eye and respiratory tract irritation, headaches, dizziness, visual disorders, and memory impairment are among the immediate symptoms that some people have experienced soon after exposure to some organics.

Increase ventilation when using products that emit VOCs. Meet or exceed any label precautions. Do not store opened containers of unused paints and similar materials within the school. Formaldehyde, one of the best known VOCs, is one of the few indoor air pollutants that can be readily measured. Identify, and if possible, remove the source.

If not possible to remove, reduce exposure by using a sealant on all exposed surfaces of paneling and other furnishings. Use integrated pest management techniques to reduce the need for pesticides.

- Use household products according to manufacturer's directions.
- Make sure you provide plenty of fresh air when using these products.
- Throw away unused or little-used containers safely; buy in quantities needed.
- Keep out of reach of children and pets.
- Never mix household care products unless directed on the label.





## Allergens (Dust mites)

Dust mites are microscopic insects that live in abundance in people's homes. They are microscopic so you cannot see them. They are ideally suited to home life because dust mites avidly consume the skin particles shed by humans and animals. They also tend to make their home in places like pillows and mattresses.

Dust mites eat skin cells people shed, and rather than drinking water, they absorb water from humidity in the atmosphere. Household dust contains all kinds of tiny particles, but a large portion of it is made up of human skin cells. This dust is easily trapped in the fibers of bed linens, furniture cushions and carpeting. These materials also hold moisture well.

Body parts and droppings from dust mites can trigger asthma in individuals with allergies to dust mites. Exposure to dust mites can cause asthma in children who have not previously exhibited asthma symptoms.

Common house dust may also contain asthma triggers. These simple steps can help:

- Dust often with a damp cloth.
- Use a vacuum with a HEPA filter on carpet and fabric-covered furniture to reduce dust build-up. People with asthma or allergies should leave the area being vacuumed.

Corrective actions to reduce exposure to dust mites include:

- Wash bedding in hot water once a week. Dry completely.
- Use dust proof covers on pillows and mattresses.
- Vacuum carpets and furniture every week.
- Choose stuffed toys that you can wash.

# Water Quality - Bacteria

When it comes to the water we use in our homes from household faucets, it is from either a public system or a private well. Most public systems and some wells use disinfectants before it is sourced to the home and it usually succeeds at removing large amounts of bacteria. However, not all bacteria are removed and the water is not sterile — there are still bacteria present. Not all bacteria are harmful but when the bacteria that can cause illness accumulate it can cause people illness.

These bacteria live in the water or on the inside surfaces of water pipes, where some of them build up over time, producing large concentrations of bacteria or contribute to slimy bio-films. At any time these bacteria can get released into the water supply. As the bacteria are past the point of treatment, they may be ingested into our bodies when drinking or washing with this water.

Another avenue for ingestion or inhalation of large concentrations of bacteria exists when using the shower. Bacterial build up in shower heads overtime can result in the dislodgement of numerous bacteria when using the shower. The pink discoloration sometimes present on the showerhead is composed of bacteria and other microorganisms. The bacteria are growing as all they need is moisture and extremely small trace amounts of nutrients to survive.

They can live on material in dust and on phosphates (present in water) as well as trace nutrients in your water supply. As the water pours out, the bacteria in the water may be ingested into the body if water enters our mouth. Also, as the water pours out, the bacteria present become aerosolized and the occupant may inhale the bacteria into their lungs.

Although we are exposed to bacteria everyday it is pertinent that we monitor the water quality and the water delivery appliances because it is in everyone's best interest to attempt to reduce exposure to high concentrations of bacteria.



# Household Surfaces - Bacteria

All around us bacteria are present; some examples include our homes, schools and work offices. Bacteria in many cases are harmless and in some cases can be beneficial to humans; an example is in the food industry. However, exposure to bacteria, especially certain types of bacteria, can have a negative impact on our health. Susceptible individuals including immuno-compromised individuals, young children and the elderly are especially susceptible.

Our behaviors in our home and work environments have the ability to increase our potential to inhale or ingest bacteria that may cause illness. Some examples include food preparation, toilet hygiene and other general household activities. These activities may introduce or fail to remove bacteria from our indoor environments. Exposure to these bacteria can cause upset stomachs, nausea, diarrhea, food poisoning and other bacterial infections. The average person in the United States contracts a bacterial related illness (respiratory or intestinal) on average 7 times a year, many times not even being aware of the illness. Understanding whether elevated concentrations of bacteria exist in these areas of the home is the only way to control daily exposures.

Steps to reduce bacteria exposure include:

- Using gloves and a face mask; scrub all horizontal countertops, floor surfaces and grout lines between tiles with a natural based anti-bacterial solution and rough haired brush.
- If using a sponge mop or regular cloth mop to clean floors, ensure it is dried fully between uses to reduce the potential for bacteria to grow. Bacteria love moisture and the dust and dirt accumulated in the mop provide nutrients for their growth.
- Ensure adequate cleaning of door handles, switches and any other surface that comes in contact with human hands, animals or food products. Also, key areas such as refrigerators require regular cleaning to help reduce the presence of bacteria.
- Regular replacement of sponges is recommended and purchasing germ resistant sponges can lower the amount of bacteria in the kitchen.



# Mold

Mold growth indoors is usually a result of favorable conditions occurring for growth. Mold requires two main factors for growth, moisture and a nutrient source (there are others but these two factors are of primary importance for growth). As many of our homes and buildings are made with building materials that contain food sources (paper on drywall, gypsum etc) it is easy for mold to grow once moisture in the form of water from a leak or water vapor in the air is available.

Once the conditions are present, mold growth can occur as quickly as seventy two hours. Even when the favorable conditions for mold growth are not present after growth has occurred, mold spores can remain and cause occupants problems. Mold growth indoors is often present in areas not visible to the eye including in wall cavities, ductwork and behind baseboards. Exposure to mold can have different effects on individuals depending on age, medical history and susceptibility. Allergies, respiratory irritation and other health related issues are common when exposed to indoor environments with mold growth present.

Moisture control is the key to mold control, some steps to reduce moisture issues:

- Fix leaks and seepage. If water is entering the house from the outside, your options range from simple landscaping to extensive excavation and waterproofing. (The ground should slope away from the house.) Water in the basement can result from the lack of gutters or a water flow toward the house. Water leaks in pipes or around tubs and sinks can provide a place for biological pollutants to grow.
- Use exhaust fans in bathrooms and kitchens to remove moisture to the outside (not into the attic). Vent your clothes dryer to the outside.
- Use air conditioners, especially in hot, humid climates, to reduce moisture in the air, but be sure that the appliances themselves don't become sources of biological pollutants.
- Raise the temperature of cold surfaces where moisture condenses. Use insulation or storm windows. (A storm window installed on the inside works better than one installed on the outside.) Open doors between rooms (especially doors to closets which may be colder than the rooms) to increase circulation. Circulation carries heat to the cold surfaces. Increase air circulation by using fans and by moving furniture from wall corners to promote air and heat circulation. Be sure that your house has a source of fresh air and can expel excessive moisture from the home.

*Source: USEPA Mold Facts, Mold Remediation in Schools and Commercial Buildings, An Introduction to Indoor Air Quality. Washington, D.C., United States Environmental Protection Agency.*



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