

Indoor Air Quality

Facts

There are many types of indoor pollutants that have been implicated in indoor air quality (IAQ) problems.

- [Airborne dust](#)
- [Asbestos](#)
- [Bioaerosols](#) (living and nonliving biological air contaminants)
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It is important to recognize that comfort and or illness may not be related to indoor air quality. Noise, lighting, ergonomic stressors, and job related psycho-social stressors can also contribute.

[Communicating IAQ Problems](#)

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Communicating IAQ Problems

All IAQ investigations begin with a call to the Facilities & Operations Work Order Management. When an IAQ problem is caused by a situation, such as inadequate ventilation or excessive mold, then the problem may require a more detailed investigation. This may involve a contracted Industrial Hygienist and/or an upper level maintenance representative from Facilities & Operations. Sometimes the remedy may call for an extensive project and may be delayed by the need for non-routine sources of funding.

- Report poor indoor environment conditions to Facilities & Operations Work Order Management at wodesk@uah.edu or 824-6490. These conditions include but are not limited to stuffy air, heating and cooling problems, annoying odors, wet surfaces, etc.
- Report water intrusion into buildings as soon as possible to the Facilities & Operations Work Order Management at wodesk@uah.edu or 824-6490. The longer a material stays wet the higher the likelihood of excessive mold growth on the material.
- Contact the Office of Environmental Health & Safety when IAQ problems are persistent and if you have questions.

Preventing IAQ Problems

- Limit the use of products that produce odors or volatile solvents to specifically designed rooms and ventilation systems such as fume hoods, snorkel exhaust, etc. This applies to equipment that produces heat and odors as well.
- Minimize generation of dust or aerosols in the work area and insure the proper ventilation for dusts and aerosols is used.
- Maintain good housekeeping in work and break areas. Throw away old plants, garbage, food and clean up all spills immediately.
- Carpeting in offices and work areas should be cleaned frequently.
- Add water to floor drains and other drains that are not used frequently to prevent sewer odors from entering the building.
- Smoke at least 25 feet away from all campus buildings.
- Do not turn the air conditioner down to low. Cold air causes humidity to condense out of the air and dampen surfaces providing a water source for mold to grow.
- Do not open windows when air conditioning or heating is running. This allows moisture into the room.
- Do not place wet items, e.g., umbrellas, shoes, etc. in your office, leave them in the hallway or other place to dry.
- Remove live plants from the office environment. Live plants harbor many molds in the soil and may release large amounts of spores.

Airborne Dust

Airborne dust is particles and fibers that float in our daily environments and is typically not a health concern. Certain conditions will cause will allow the release of large quantities of airborne dust creating an environment that is a nuisance and possible a hazard to building occupants.

Asbestos

For information on asbestos containing material locations contact the OEHS at 824-6053.

Asbestos is a natural occurring mineral that has been mined for it's useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. The three most common types of asbestos are chrysotile, amosite, and crocidolite. Asbestos containing material is also referred to as ACM. The term friable is used to distinguish when ACM can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

Asbestos is made up of microscopic fibers that may become airborne when disturbed. These fibers may become inhaled into the lungs. Research has not determined a "safe level" of exposure but we know the greater and longer the exposure, the greater the risk of contracting an asbestos related disease. The risk is significantly higher to smokers exposed to asbestos.

UAH has identified and mitigated asbestos containing materials that pose an immediate threat to building occupants. There are materials that are still being produced and used in the United States that contain asbestos. Building materials containing asbestos have been identified and are observed for signs of degradation on a regular basis. For information on ACM locations contact the OEHS at 824-6053.

Health Problems Related to Asbestos Exposure

Asbestosis - a lung disease first found in naval shipyard workers. As asbestos fibers are inhaled they may become trapped in lung tissue. The body tries to dissolve the fibers by producing an acid. The acid does not dissolve the fiber but may result in scarring of the lung tissue. Eventually, the scarring may become so severe that the lungs cannot function. The latency period (time for this disease to develop) is 25 - 40 years.

Mesothelioma - A cancer of the outer lining of the lung chest cavity and or the lining of the abdominal wall. This form of cancer has only been associated with asbestos exposure. The latency period is 15 - 30 years.

Lung Cancer - Caused by asbestos. The effects of lung cancer are often greatly increased by cigarette smoking (by about 50%. The latency period for cancer is often 15 - 30 years.

Where Asbestos is Found

Asbestos is commonly used as an acoustic insulator, thermal insulation, fireproofing and in other building materials. Asbestos fibers are incredibly strong and have properties that make them resistant to heat. Many products that are in use today contain asbestos.

Common products containing asbestos

Cement Pipes	Laboratory Hoods/Table Tops	Elevator Brake Shoes
Cement Wallboard	Laboratory Gloves	HVAC Duct Insulation
Cement Siding	Fire Blankets	Boiler Insulation
Asphalt Floor Tile	Fire Curtains	Breaching Insulation
Vinyl Floor Tile	Elevator Equipment Panels	Flexible Duct
Fabric Vinyl Sheet Flooring	Caulking/Putties	Cooling Towers
Flooring Backing	Adhesives	Pipe Insulation
Construction Mastics	Wallboard	Ductwork
Acoustical Plaster	Joint Compounds	Vinyl Wall Coverings
Decorative Plaster	Spackling Compounds	High Temp Gaskets
Textured Paints/Coatings	Roofing Shingles	Roofing Felt
Ceiling Tile & Lay-in Panel	Base Flashing	Thermal Paper Products
Spray-Applied Insulation	Fire Doors	Electrical Cloth
Blown-in Insulation	Electrical Panel Partitions	Fireproofing Materials
Thermal Taping Cmpds	Packing Materials	Electric Wire Insulation
Chalkboards		

Banned Asbestos Containing Products:

Fireproofing/insulation

For decorative purposes

Corrugated paper

Rollboard

Commercial paper

Specialty paper

Flooring felt

New uses of asbestos

The spray-on application of materials containing more than 1% asbestos to buildings, structures, pipes, and conduits unless the material is encapsulated with a bituminous or resinous binder during spraying and the materials are not friable after drying.

Asbestos Containing Products Not Banned:

Asbestos-cement corrugated sheet

Asbestos-cement flat sheet

Asbestos clothing

Pipeline Wrap Friction materials

Disc brake pads

Drum brake linings

Brake blocks

Gaskets

Non-roofing coatings

Automatic transmission components

Roof coatings

Clutch facings

Roofing felt

Vinyl-asbestos floor tile

Asbestos-cement shingles

Millboard

Asbestos-cement pipe

Spray-on application of asbestos containing materials on equipment and machinery provided that the asbestos fibers in the materials are encapsulated with a bituminous or resinous binder during spraying the material and the material is not friable after drying; for friable materials, no visible emissions can be discharged to the outside air from spray-on application, or specified methods are used to clean emissions containing particulate asbestos material before they escape to, or are vented to, the outside air.

Bioaerosols

This term refers to living and non-living biological air contaminants. It can include, mold and mildew (fungi), bacteria, viruses, algae, dust mite allergens, animal dander and pollen. Exposure to molds and other fungi and their spores is unavoidable except when the most stringent of air filtration, isolation, and environmental sanitation measures are observed,

Many IAQ problems begin as moisture problems such as leaks, floods, or excessive humidity. These moist conditions allow organisms such as mold and mildew to grow rapidly. These conditions can be found in many locations, such as bathrooms, damp or flooded basements, wet appliances (humidifiers and air conditioners), and some carpets and furniture. Mold, mildew and other biological contaminants can also grow in poorly maintained building ventilation systems. These systems can distribute the contaminants through the building to the occupants.

Carbon Dioxide

Carbon dioxide is a colorless odorless gas that is emitted through human respiration. It is indicative of an improperly functioning heating ventilating and air conditioning system.

Carbon Monoxide

Carbon monoxide is a colorless odorless gas that is produced through the incomplete combustion of fuels. It is indicative of an improperly functioning heating ventilating and air conditioning system. Carbon monoxide is also emitted from combustion motors, kerosene heaters, furnaces, woodstoves, gas powered stoves and heaters, and tobacco smoke.

Symptoms of carbon monoxide inhalation vary depending on the amount of carbon monoxide that has been inhaled. Symptoms include nausea, headache, fatigue, dizziness, disorientation, weakness and confusion. Extremely high levels can cause death.

Environmental Tobacco Smoke

Environmental tobacco smoke refers to exposure to tobacco smoke from someone else's cigarette, cigar, pipe. ETS is the material indoors that originates from tobacco smoke. It is also known as second hand smoke.

Tobacco smoke consists of solid particles and gases. More than 4,000 different chemicals have been identified in tobacco smoke. The number of these chemicals that are known to cause cancer in animals, humans, or both are reported to be in the range from 30 to 60.

The solid particles make up about 10 percent of tobacco smoke and include "tar" and nicotine. The gases or vapours make up about 90 percent of tobacco smoke. The major gas present is carbon monoxide. Others include formaldehyde, acrolein, ammonia, nitrogen oxides, pyridine, hydrogen cyanide, vinyl chloride, N-nitrosodimethylamine, and acrylonitrile. Of these, formaldehyde and vinyl chloride are suspected or known carcinogens in humans. N-nitrosodimethylamine and acrylonitrile have been shown to cause cancer in animals.

The potentially serious side effects from ETS, as well as other safety considerations, has resulted in the development of The University of Alabama in Huntsville [Smoking and Tobacco Products Use Policy](#). This policy disallows smoking within 25 feet of any campus building except in designated smoking locations.

Formaldehyde

Formaldehyde is a colorless chemical with a strong pungent odor. It is used in industry in many building materials and household products e.g., glues, wood products, preservatives, and insulation. Products such as particle board, cabinets and furniture, plywood wall panels, and urea-formaldehyde insulation can off-gas formaldehyde gas. Off gassing in new building can come from building materials and textiles.

Using the following precautions may decrease formaldehyde exposures:

- Purchase pressed wood products labeled as low emitting or products made from phenol formaldehyde, such as oriented strand board or soft plywood.
- Increase ventilation after bringing formaldehyde containing products into your home or office.

- Laminate unfinished pressed wood surfaces of cabinets, furniture, or shelving with a water based sealant.
- Use alternate products such as lumber, metal, or solid wood furniture.
- Maintain moderate temperatures and low relative humidities (30 – 60%)
- Avoid tobacco smoking indoors.

Laboratory Chemicals

Laboratory chemicals can be a source of indoor air quality issues it is therefore mandatory that chemicals be stored and used in compliance with manufacturer guidelines and applicable regulations, including but not limited to the National Fire Protection Agency and the Environmental Protection Agency and The Occupational Safety and Health Administration.

Fume hoods are provided as an engineering control in chemical laboratories. Each person using a fume hood is highly encouraged to review manufacturer guidelines prior to use.

Ozone

Ozone is a colorless gas with a distinctive odor, some say it is pungent. Ozone odor can be detected at a much lower concentration than the concentration that causes symptoms. Ozone is a primary component of photochemical smog outdoors and indoors it can be generated from electrostatic air cleaners, electrical motors, and photocopier machines. Symptoms of ozone exposure may include headache, fatigue, cough, respiratory irritation, shortness of breath, and eye irritation. Indoor concentrations of ozone can be minimized through adequate ventilation and maintenance of photocopier machines and electrical equipment.

Radon

Radon in air is ubiquitous. Radon is found in outdoor air and in the indoor air of buildings of all kinds.

EPA estimates that about 20,000 lung cancer deaths each year in the U.S. are radon-related. Exposure to radon is the second leading cause of lung cancer after smoking. Radon is an odorless, tasteless and invisible gas produced by the decay of naturally occurring uranium in soil and water. Radon is a form of ionizing radiation and a proven carcinogen. Lung cancer is the only known effect on human health from exposure to radon in air. Thus far, there is no evidence that children are at greater risk of lung cancer than are adults.

Due to the fact that people spend many hours of the day in their homes, the most significant chance for exposure to radon is in the home. The Environmental Protection Agency (EPA) and the Surgeon General recommend that all homes be tested below the third floor.

UAH has placed radon mitigation systems in several buildings testing above 4.0 picocuries radon per liter of air over a one year period. New UAH facilities are typically planned and constructed with radon mitigation systems in place.

Campus Facilities with Radon Mitigation Systems

Morton Hall

Von Braun Research Hall

Shelby Center for Science and Technology

Intermodal Center
Cramer Hall
Residence Halls
Greek Housing

Volatile Organic Compounds (VOCs)

VOC's are organic compounds that can be the source of IAQ problems when their concentrations exceed normal background levels. Potential sources include personal care products, cleaning products, paints, lacquers, varnishes, pesticides, pressed wood products, and insulation. Microorganisms have been shown to release VOC's which results in a moldy, musty odor.

Indoor levels of VOC's can be kept to a minimum by selecting products that are low emitting when possible. In addition, VOC concentrations can be diluted through effective ventilation.

Literature References:

Centers for Disease Control and Prevention. Indoor Environmental Quality. URL <http://www.cdc.gov/niosh/topics/indoorenv/>

Environmental Protection Agency. Indoor Air Quality (IAQ). URL <http://www.epa.gov/iaq>

Occupational Safety and Health Administration. Indoor Air Quality. URL <http://www.osha.gov/SLTC/indoorairquality/>