

# Indoor Air Quality

In Your Home and at Work

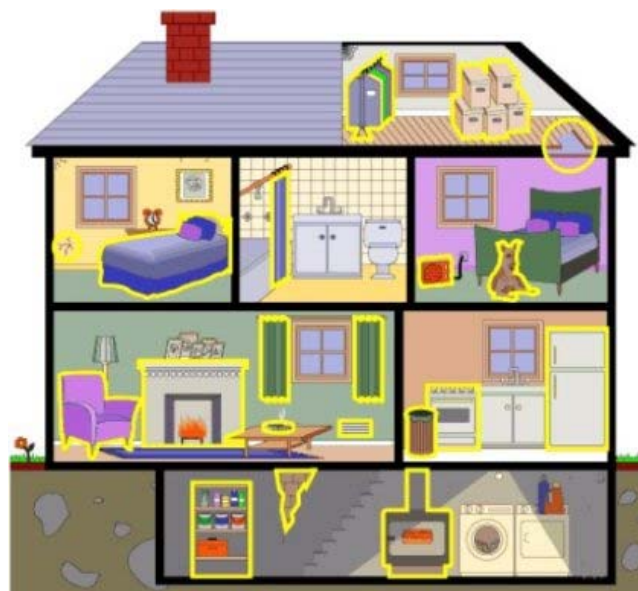


**Forsyth County**  
**Office of Environmental Assistance and Protection**

# Indoor Air Quality

Indoor air has always contained natural and man-made impurities such as bacteria, viruses, fungi, radon, and combustion by-products from burning. In recent years, additional contaminants such as asbestos, formaldehyde, and other organic chemicals have been identified in indoor air. Mold has also become a common problem. Energy efficient homes and commercial buildings are popular today to reduce heating and cooling costs. However, if they are not properly designed and constructed, the resulting indoor air contaminants could affect the comfort and health of the occupants.

Poor indoor air can affect people in many ways. One person in the household could be allergic to mold while another occupant may have a problem with formaldehyde. Unfortunately, it is sometimes difficult to determine the cause of the problem. Why do I get headaches or a sore throat when I get home at night when I felt good at work all day? Why do my eyes become irritated when I get to work when I felt fine at home? Why does the air in my home feel stuffy or smell stale when I enter from the outside? These are common problems and questions today. Sometimes the answer is medically related or a common allergy and other times the answer is the air quality of the building or home in which you experience the problems. Usually, it is not simple to determine the cause of the problem.



If you are experiencing any of these problems the first thing you may think of is to run a test of the air in your home. Testing the air is not always as easy as it sounds; it can get expensive, and often is not necessary. First of all, there does not exist one test to determine an indoor air problem. Testing the air usually requires a series of tests to narrow down a problem (if one exists). This can be time consuming and get expensive with no guarantee of an answer. In order to test indoor air, you have to have some idea of the source of the problem. For example, if you suspect radon, you can run a radon test. Do-it-yourself radon test kits are inexpensive and easy to use. However, you can not run one test to find out why you get watery eyes when you sit in your living room. Most indoor air problems can be resolved by someone experienced with indoor air problems through investigation that starts with a visual inspection and being informed with a background of the problem. With any health related problem, it is best to consult a



doctor first to help diagnose the problem and then determine if indoor air is causing or contributing to the problem.

## Detecting Indoor Air Problems

Any health related issue should be discussed with a physician first to determine the cause, but there are also some simple ways to check for poor indoor air quality.

Health effects that occur only in the home and disappear after the person leaves the home can indicate a problem. Health effects may occur immediately after moving into a home, or after refurnishing or remodeling. New carpeting or new furniture are prime sources of indoor air contaminants that can release gases or particles into the air.



Newer homes are more tightly built, and older homes are being weatherized to reduce the cost of heating and cooling the house. As a result, if too little outdoor air enters the home, pollutants from indoor sources can build up to levels that can cause discomfort or health effects. To prevent this buildup, the sources or pollutants must be controlled or more fresh air provided.

Additional indications of poor indoor air include moisture condensation on windows or walls and signs of water leaks. Sometimes lifestyle choices can contribute to indoor air quality problems. Pets, tobacco smoke, cooking habits, household product use, and hobbies can affect contaminant levels in a home.

Some air pollutants (such as radon and carbon monoxide) can not be smelled or seen. Formaldehyde is a colorless gas with a distinct odor at higher concentrations. Asbestos fibers are so small they can be in the air yet invisible to the human eye.

As a result some indoor air problems can be obvious, while others are not. If you suspect an indoor air problem at home or at work, there are numerous resources over the internet that can help you solve your dilemma. The links located in this webpage list several helpful websites.

A trained Indoor Air Specialist is available by telephoning the Office at (336) 703-2440. Simply state that you have an indoor air question/problem, and you will be referred to someone that can help solve your problem. Many times, however, the indoor air question is too complicated to solve over the phone. This may include a house/business inspection or referral to another City/County Department that may specialize in your problem.

# Common Indoor Air Pollutants:

## Mold

Molds are a part of our natural environment. They are forms of fungi (microscopic organisms), grow year round, and can be found indoors and out. Outdoors they can be found in shady, damp areas or places where leaves or other vegetation is decomposing. Indoors they can be found where humidity levels are high such as basements or showers. Mold will grow and multiply under the right conditions, needing only sufficient moisture (example: in the form of very high humidity, condensation, or water from a leaking pipe, etc.) and the right material to grow on. Mold growth is encouraged by warm and humid conditions, although it can grow during cold weather.



There are thousands of species of mold and they can be any color. Molds may be gray, black, green, yellow, orange, or various other colors and may have a velvety or wooly structure. Molds produce tiny spores in order to reproduce. Mold spores continually sift through the air, both indoors and out. When they land on a damp spot they may begin growing and digesting whatever they are growing on in order to survive. Indoors, molds tend to grow on porous materials such as wood, sheet rock, insulation, paper, fabrics, carpet, foods, and other organic materials. Molds gradually destroy some things they grow on.

## Sources

Mold growth will occur if there is sufficient moisture. Common sources of moisture include:

- Flooding
- Roof leaks
- Humidifiers
- Plumbing leaks
- Drainage problems
- Damp basements & crawl spaces
- Steam from the bathroom or kitchen
- Condensation from a heating/AC unit
- Poor or improper ventilation of combustion appliances
- Condensation resulting from poor or improper insulation or ventilation



Indications of a moisture problem may include discoloration of the ceiling or walls, warping of the floor, or condensation on the walls or windows. The key to preventing mold growth is to control moisture problems.

### **Health Effects**

Exposure to mold can cause health effects in some people. Some people are sensitive to mold and if they inhale or touch mold certain allergic reactions can result. Symptoms such as nasal stuffiness, headaches, throat or eye irritation, coughing or wheezing, or skin irritation may occur. More severe reactions may include fever and shortness of breath. Molds can also trigger asthma episodes in sensitive asthmatics.

### **Control Methods**

The control of moisture and humidity is the key to controlling mold.

If water leaks or spills occur indoors, ACT QUICKLY.

If wet or damp materials or areas are dried up 24 – 48 hours after a leak or spill occurs, in most cases mold will not grow.

Wet carpets should be rolled back and allowed to dry completely.

Air conditioning drip pans should remain clean and the drain lines unobstructed and flowing properly.

The ground should slope away from the building foundation so the water does not enter or collect around the foundation or flow into the crawl space or basement.

Indoor humidity should be kept low, if possible below 60 per cent.

If condensation or moisture is observed collecting on windows or walls the wet surface should be dried and the water source reduced. Condensation can be a sign of high humidity.

Appliances that produce moisture should be vented. Clothes dryers, stoves, kerosene heaters should be vented to the outside when possible. These appliances produce water vapor and will increase humidity unless vented to the outside.

Run the bathroom fan or open the window when showering.



# Carbon Monoxide (CO)

Carbon monoxide is a colorless, odorless gas that can be fatal when breathed. Carbon monoxide is produced by the incomplete combustion (burning) of fuels. This can occur several ways:

- When flues or chimneys become blocked so exhaust cannot be vented to the outside.
- When a fuel-burning furnace has a cracked or rusted heat exchanger that allows combustion gases into the living spaces.
- When fuel-burning space heaters (kerosene or gas), ovens, ranges, or grills are operated in the home without adequate ventilation.
- When car exhaust from an attached garage enters the home.



Harmful buildups of these gases can occur when exhaust from combustion equipment is not vented to the outside of the home, and when combustion equipment is not in good working order and is not regularly inspected for safe operation. Some homes may also have a problem with “backdrafting.” That’s when the air pressure inside the home is less than the air pressure outside the home, causing combustion by-products from furnaces, water heaters, fireplaces, and similar equipment to spill back into the room rather than being vented outside. Backdrafting can also occur when natural draft appliance exhaust is pulled back into the house by mechanical ventilation such as a down-draft kitchen power vent.

## Health Effects

Carbon monoxide is absorbed through the lungs into the blood where it interferes with the blood’s ability to carry oxygen. At low levels it can cause fatigue in healthy people and chest pain in people with heart disease. At higher levels, carbon monoxide can cause headaches, dizziness, weakness, nausea, and confusion. Very high levels can cause death.

Carbon monoxide symptoms can be similar to the flu. Carbon monoxide may be the problem when you feel bad only when you are inside the home and the symptoms gradually disappear after you have left, or if more than one person in the home has similar symptoms.

## **Control Methods**

To reduce the risk from carbon monoxide keep all combustion equipment well-maintained and inspected for safety. Experts recommend having your combustion heating systems inspected by a trained professional every year. Such inspections should look for blocked openings to flues and chimneys, cracked or disconnected flue pipe, signs of soot around openings in your furnace or boiler, rust or cracks in the heat exchanger, and exhaust or gas odors. Always operate combustion equipment for its intended use and make sure it has been installed properly. Never use unvented combustion appliances indoors (including space heaters), or use a gas stove for heating your house.



Carbon monoxide alarms can be installed which will alert you to dangerous levels of this invisible gas. It is important to choose and place an alarm wisely and maintain it to assure accurate sensing of carbon monoxide.

## **Formaldehyde**

Formaldehyde is a colorless gas which has a distinctive, pungent odor at higher concentrations. It has a number of useful properties, is a good preservative and products made with formaldehyde make an excellent adhesive. It is widely used in some products in the building and furniture industries and is also found in some textile products as an anti-wrinkle agent.

### **Sources**

Formaldehyde is released from some household products such as plywood, particleboard, draperies, wallpaper, furniture fabrics, glues and adhesives, tobacco smoke, some personal care products, and some foam insulation. As these materials age, they generally stop releasing significant amounts of formaldehyde.



### **Health Effects**

Short term, low-level exposure may cause temporary eye, nose, and throat irritation. Some people may become more sensitive to formaldehyde after an initial exposure.

## **Control Methods**

Formaldehyde exposure can be reduced by avoiding products that contain formaldehyde or buying low-emitting formaldehyde products. Where new formaldehyde-containing products have been installed, ventilation can be temporarily increased. High humidity and high temperatures will increase the rate at which formaldehyde escapes from materials. Air-conditioning and dehumidification may help to reduce formaldehyde.



## **Radon**

Radon is a colorless, odorless gas that occurs naturally and is found everywhere at varying low levels. Radon is constantly produced from the breakdown of uranium in soil or rock.

### **Sources**

The most significant source of radon in homes is the underlying soil. Radon gas in the soil can enter homes through dirt crawlspaces, cracks in the basement walls or floors, floor drains, or sumps. The air pressure inside a house is typically lower than the pressure in the air and in soil around the building. This difference in pressure causes the home to exert a slight “vacuum effect” that draws radon gas into the home. If water is supplied to a home from an underground well, there is a chance that radon may enter the home in the water supply. Typically the health risk from radon entering a home through the water is much less than the risk of radon entering the home through the soil.



### **Health Effects**

Exposure to radon increases the risk of lung cancer.

### **Control Methods**

All homes should be tested for radon to know if there is a radon problem. If radon levels are high, the problem is fixable. There are several proven methods to reduce radon levels in homes, but the one most commonly used is a vent pipe system and fan, which pulls radon from beneath the house and vents it to the outside. The cost depends on your home’s location, construction, and levels of radon. The U. S. Environmental Protection Agency advises that steps be taken to reduce radon levels in the home if the levels are at or above 4 picocuries per liter of air (pCi/l).

Short and long term radon test kits are available to the public at minimal cost from the Forsyth County Office of Environmental Assistance and Protection. A Radon Specialist is



also available to answer questions about radon and to assist you in obtaining the proper type and number of test kits for your particular home or building. For information call (336) 703-2440 and state that you have a radon question/problem.

## Environmental Tobacco Smoke (ETS)



ETS is a complex mixture of over 4700 chemical compounds, including gases and particles, from incompletely burned tobacco.

### Sources

Environmental tobacco smoke is the secondhand smoke exhaled by smokers and the sidestream smoke from the burning of cigarettes, cigars, and pipes.

### Health Effects

According to the USEPA, short term exposure to ETS can irritate the eyes, nose, and throat. Long-term exposure can cause respiratory problems, such as wheezing, bronchitis, pneumonia, and lung cancer. Asthma attacks may be precipitated by respiratory irritation or infections related to ETS exposure.

### Control Methods

ETS can be totally removed from indoor air only by removing the source: cigarette, cigar, and pipe smoking. A separate smoking area, mechanical ventilation, or air cleaners may reduce, but will not eliminate non-smokers exposure to ETS.

## Lead

Lead is a naturally occurring soft metal that was once widely used in gasoline, paint, and plumbing fixtures. Lead was used in house paint until 1978 when it was banned. Lead solder for pipes was also banned, but there are plenty of older homes with these high lead materials still in them.



## Sources

Lead can be found in paint, dust, soil, and water. Lead poisoning in homes most commonly occurs when a child eats paint chips, sucks on lead-dusted hands and toys, or chews on lead painted window sills and stair rails. In most cases lead based paint in good condition is not a hazard. In most cases, older homes have been painted multiple times resulting in the older lead based paint being covered several times and therefore, less of a hazard. Renovation and home remodeling projects should take lead paint into consideration especially if sanding or sand-blasting of paint is being planned. Sanding and sand-blasting of lead based paint can emit lead dust into the air and create a hazard.



Drinking water may also contain lead from old pipes or solder, particularly if the water is soft, corrosive, or acidic. The longer water stands in pipes, the greater the possibility of lead being dissolved in it.

Other potential sources of lead exposure include hobbies (such as working with stained glass), food and liquids stored in lead crystal, lead-glazed pottery or porcelain, and indoor target ranges.

## Health Effects

Some health effects associated with exposure to lead include nerve and brain damage, anemia, kidney damage, and growth retardation. All children up to six years old should be tested for lead poisoning if their doctors think they are at risk. Children are at a higher risk from lead exposure because they put their hands in their mouth, their growing bodies absorb more lead, and their brains and nervous systems are more sensitive to the damaging effects of lead. If lead gets into a child's body, it could cause a lower IQ, kidney damage, hearing loss, headaches, slowed growth, anemia, or behavior problems.

## Control Methods

Deteriorating paint or high levels of dust can pose a hazard in homes with lead paint. Paint chips should be cleaned up immediately and excessive dust should be cleaned regularly. Paint suspected to contain high levels of lead should not be removed by dry scraping, belt-sanding, propane torch, or heat gun because these actions generate large amounts of dust and fumes.

## Asbestos

Asbestos is a name given to a group of naturally occurring minerals found throughout the world. The asbestos mineral



is composed of bundles of fibers that are very durable, heat resistant, and noise absorbing. Asbestos products have proven to be very resilient and have been used in building products since the late 1800's. In 1971 asbestos was declared unsafe and listed as a hazardous air pollutant by the United States Environmental Protection Agency. Asbestos has proven to be superior over other materials as long as it remained intact. When asbestos is disturbed and becomes air-borne and an individual inhales it severe health problems could result.

### **Sources**

Asbestos has been banned from some products and voluntarily removed from others but still remains in thousands of products, homes, and buildings.

It is also still being used in some products being manufactured today. Asbestos is common in buildings built prior to 1980 and can be found in buildings built beyond 1980. Asbestos has been used in pipe and boiler insulation, floor tile and floor coverings, ceiling materials including sprayed on texturing and tiles, and roofing and cementitious products. Most times asbestos can be in a product and can not be determined by sight.

### **Health Effects**

Health effects resulting from exposure to asbestos depend on many factors. Normally the greater the exposure, the greater the chance of getting an asbestos-related disease. Most health effects related to asbestos also have a latency period meaning that health problem from exposure to asbestos have a delayed effect and may not appear for fifteen to forty years.



### **Control Methods**

Asbestos materials are not a hazard unless they are in a condition where the fibers can become air-borne. If asbestos is in a product such as flooring that is in good condition there is no need to remove it. If not done properly, replacing the asbestos flooring can be a bigger hazard than if it was left intact on the floor. Asbestos does not have to be removed but if it is, it should be handled properly by someone trained to work with it.

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**This document provided by the Forsyth County  
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**For more information, contact the Office's Indoor Air Quality Program  
by telephone: (336) 703-2440 or email: [gremmerk@forsyth.cc](mailto:gremmerk@forsyth.cc).**

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