

Managing Indoor Air Quality



Mar Mar Aye
*Advisor for Air Quality Management
 A member of the IAQA
 Technical Services Division
 Jardine Matheson (Thailand) Limited*

Indoor air quality should be of prime concern to all individuals who live work or play in any building. Poor air quality is a risky problem and because it is “invisible,” most people are not usually aware of its potential harm. Most of the things that create poor air quality are not noticeable to ones sense of smell or vision. With carefulness, we can create a better living environment for ourselves and those we live and work with, now and in the future.

Health effects of indoor air pollution:

Indoor air pollution have a number of effects and various complaints arise these are associated with IAQ problems. Such symptoms include:

- Upper respiratory irritation, coughing and congestion

- Itching, watering eyes
- Sinus irritation, sneezing
- Headache, dizziness, nausea
- Fatigue, listlessness, loss of concentration
- Shortness of breath

Health Problems Associated with polluted Indoor Air

EYES
 Dryness, itching/stinging, tearing, redness.

UPPER RESPIRATORY TRACT
 (nose and throat)
 Dryness, itching/stinging, nasal congestion, nasal drip, sneezing, nose bleed, throat pain.

LUNGS
 Chest tightness, drowning sensation, wheezing, dry cough, bronchitis.

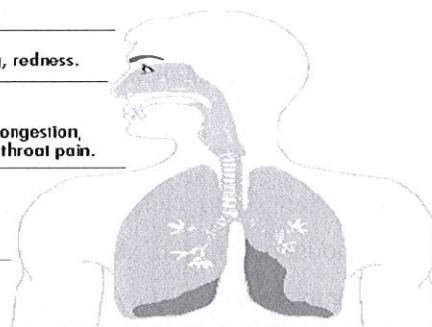
SKIN
 Redness, dryness, general and localized itchiness.

GENERAL
 Headache, weakness, drowsiness/lethargy, difficulty concentrating, irritability, anxiety, nausea, dizziness.

MOST COMMON ILLNESSES:

HYPERSENSITIVITY
 Hypersensitivity pneumonitis, humidifier fever, asthma, rhinitis, dermatitis.

INFECTIONS
 Legionellosis (Legionnaire’s disease), Pontiac fever, tuberculosis, common cold, flu. Of unknown chemical or physical origins, including cancer.



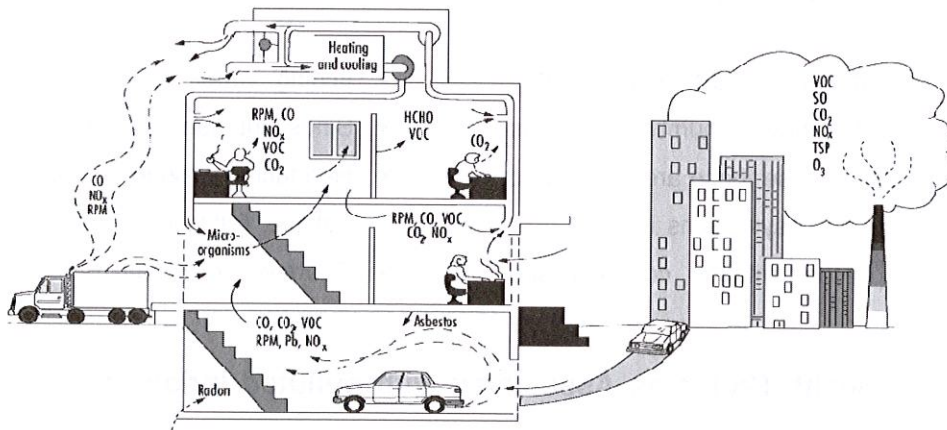
What is acceptable air quality? Acceptable indoor air quality” means that the air is free of excessive levels of chemical and physical contaminants and microbiological hazards. When we speak of indoor air quality, we must also consider outdoor air quality. Generally, pollutants present in the outdoor environment are present at a somewhat lower concentration indoors, in most cases 10 to 90%. When a pollutant appears outside, eventually, that pollutant will appear inside. This occurs because the air that is inside originates outside.

The quality of air inside a building is a combination of pollution from the air outside the building and pollution generated from sources or activities within the buildings. Indoor air quality refers to the effects, good or bad, of the contents of the air inside a structure upon its occupants. Indoor air quality is measured by the quantities

of various gases and particles in the interior environment. Poor indoor air quality occurs when gases or particles are present in concentrations that affect the satisfaction or health of occupants.

Factors that influence IAQ include the following.

- Inadequate supply of outside air.
- Contamination arising from sources within the building (e.g., combustion products including carbon monoxide and environmental tobacco smoke; volatile organic compounds from building materials, fabric furnishings, carpet, adhesives, fresh paint, new paneling, and cleaning products; ozone from office equipment).
- Contamination from outside the building (e.g., ozone, carbon monoxide, and particulate matter) through air intakes, infiltration, open doors, and windows.
- Microbial contamination of ventilation systems or building interiors.

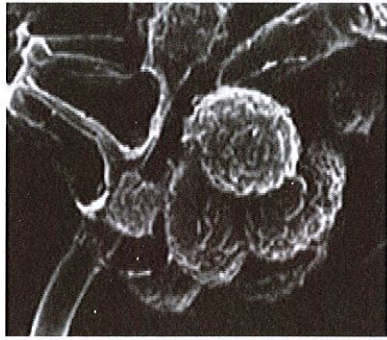


CO = carbon monoxide; CO₂ = carbon dioxide; HCHO = formaldehyde; NO_x = nitrogen oxides; Pb = lead; RPM = respirable particulate matter; VOC = volatile organic compound.

Diagram of building showing sources of indoor and outdoor

Molds and fungi are found in virtually every environment and can be detected, indoors and outdoors, year round. The number of species of existing molds and fungi is estimated from tens of thousands to three hundred thousand or more. Molds and fungi produce and release millions of spores small enough to be air-, water-, or insect-borne. They can also produce toxic agents known as mycotoxins. Spores and mycotoxins can have negative effects on human health including allergic reactions, asthma and other respiratory problems.

Moisture control is the key to mold control. To prevent for mold growth by keeping HVAC drain pans clean, flowing properly and unobstructed. Perform regularly scheduled building/HVAC inspections and maintenance, including filter cleaning. Maintaining indoor relative humidity below 70% (25-60%, if possible).



Fungus and mold spread in wall

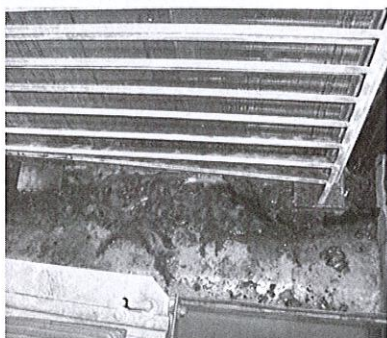
A quality indoor environment enhances occupant health, comfort, and workplace productivity. But failure to respond promptly and effectively to IAQ problems leaves building owners and facility managers vulnerable to unnecessary risks such as building-related illness, reduced productivity, accelerated building deterioration, strained relations between employers and employees or landlords and tenants, negative publicity, and potential liability problems.

A key to quality air conditioning and longevity of equipment is the establishment and performance of preventative maintenance on all mechanical and electrical systems. Preventative maintenance includes periodic checks and replacement of belts, bearings, filters, and other components requiring periodic service. One of the most important aspects of preventative maintenance is keeping equipment clean and free of dirt, scale, mold and mildew which are harmful to people and equipment and reduce effectiveness and efficiency.

The Heating, Ventilating, and Air conditioning (HVAC) system of a building plays as an essential

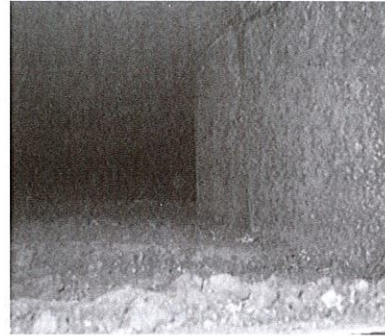
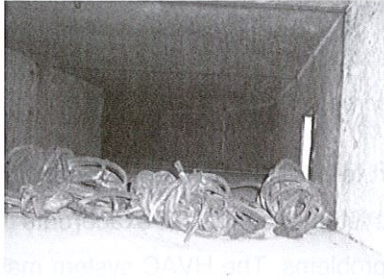
role in determining indoor air quality. HVAC systems can also exacerbate indoor air quality problems. The HVAC system may be contaminated (because of mold in duct lining or bacteria on coil or filters, for example) and the system may spread these pollutants throughout the building. Second, the HVAC duct distribution system can spread pollutants from one portion of the area to another. Regular maintenance and duct sealing can help minimize these problems.

How does the air condition system inside become a source of microbial contamination? The air drawn into a system contains dust, much of which is biological spores and other organic particles even the best filters capture only part of this material. Much of the rest falls out the air stream onto the heat transfer surfaces. It combines with water and the spores germinate and grow rapidly. The removal of such contaminants from the HVAC system should be considered as one component in an overall plan to improve indoor air quality.



Improper maintenance of HVAC system

HVAC system inspection must be part of a building overall indoor air quality management program. Systems should be cleaned when a cleanliness inspection indicate that the system contaminated with a significant accumulation of particulate or microbiological growth. Often HVAC systems become contaminated during construction and renovation activities within a building. Newly installed HVAC systems should be clean before operated.



Inspection Inside ductwork

HVAC Cleanliness Inspection Schedule (Recommended Intervals)

Source: National air duct cleaners Association

Building Use Classification	Air Handling Unit	Supply ductwork	Return ductwork/exhaust
Industrial	1 year	1 year	1 year
Residential	1 year	2 years	2 years
Light commercial	1 year	2 years	2 years
Commercial	1 year	2 years	2 years
Healthcare	1 year	1 year	1 year
Marine	1 year	2 years	2 years

There are several ways to clean a HVAC system. Recommended cleaning methods employ “Source Removal” to clean the HVAC system to remove dirt and debris. Source removal methods using vacuum units, compress air, mechanical and hand brushes, and other tools to agitate dirt and debris and get across it to a containment device for proper disposal. Removal methods must be capable of removing the foreign material to the levels specified within industrial standards. Next step requires the saturation of clean surface with a sanitizer or disinfectant, to control bacteria, yeast and fungi growth.

With growing awareness of the dangers of indoor air pollution, public concern for the cleanliness of ventilation systems has led to a significant increase demand for HVAC system cleaning service. HVAC systems can be cleaned, ventilation rates increased, biological contaminants controlled, and filtration system upgraded. The results of such actions can provide a dramatic improvement in indoor air quality. Ensuring clean, healthy indoor air is a necessity for a productive business.