Indoor Environmental (Air) Quality

Why Should You Care About Indoor Air Quality?

- We spend over 90 percent of our time indoors. Productivity, comfort, health, and well-being

- The World Health Organization estimates that approximately 30 percent of all buildings have an indoor air quality problem.

- The EPA has ranked indoor air quality among the top five environmental health risks to the public.

Source: Bureau of State Risk Management

<table>
<thead>
<tr>
<th>Location</th>
<th>Employed men</th>
<th>Employed women</th>
<th>Unemployed Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>13.4 (56%)</td>
<td>15.4 (64%)</td>
<td>20.5 (85%)</td>
</tr>
<tr>
<td>Work</td>
<td>6.7 (28%)</td>
<td>5.2 (22%)</td>
<td>--- (0%)</td>
</tr>
<tr>
<td>In transit</td>
<td>1.6 (7%)</td>
<td>1.3 (5%)</td>
<td>1.0 (4%)</td>
</tr>
<tr>
<td>Outside</td>
<td>0.7 (3%)</td>
<td>0.3 (1%)</td>
<td>0.4 (2%)</td>
</tr>
<tr>
<td>In other structures</td>
<td>1.6 (7%)</td>
<td>1.8 (7%)</td>
<td>2.1 (9%)</td>
</tr>
</tbody>
</table>

*Data based on studies of 44 U.S. cities, 1972.

Source: Indoor Air Pollution Thomas G. Robins, MD, MPH

EPA studies of human exposure to air pollutants indicate that indoor air levels of many pollutants may be 2-5 times, and occasionally, more than 100 times higher than outdoor levels.

People who may be exposed to indoor air pollutants for the longest periods of time are often those most susceptible to the effects of indoor air pollution. These groups include young children, the elderly and the chronically ill, especially those that suffer from respiratory or cardiovascular disease.
Common Indoor Air Pollutants

- **Environmental Tobacco Smoke (ETS)** – Mixture of smoke that comes from the burning end of a cigarette, pipe or cigar and exhaled smoke that contains over 4000 compounds, 40 of which are known to be carcinogenic.

- **Biological Contaminants** – Include bacteria, molds, viruses, animal dander, dust mites, cockroaches and pollen to name a few. Some may trigger allergic reactions and cause infection.

- **Radon** – Colorless, odorless gas released from Uranium which may cause lung cancer when exposed to elevated levels.

Source: Bureau of State Risk Management

Common Air Pollutants

- **Combustion Products**
  - Carbon Monoxide
  - Carbon Dioxide
  - Nitrogen Oxide
  - Particulates
  - Aldehydes
  - Sulfur Dioxide
  - PAHs

- **Volatile Organic Compounds**
  - Formaldehyde
  - Benzene
  - Xylene
  - Toluene
  - Trichloroethylene
  - PCBs
  - Pesticides

Source: Bureau of State Risk Management
Volatile Organic Compounds

- Modern furnishings, construction materials, and consumer products contaminate indoor air with numerous volatile organic compounds (VOCs)
- Sources include home-care and building maintenance materials such as disinfectants, room deodorizers, carpet shampoos, cleaning solutions, furniture polish, and floor waxes, moth crystals, fabric care products, and cosmetics
- Hobbies that call for the use of volatile hydrocarbons may at times increase exposures far beyond industrial guidelines
- Studies of VOCs found indoors reveal a vast array of aliphatic, halogenated, and aromatic hydrocarbons, alcohols, ketones, and aldehydes: in a recent Environmental Protection Agency (EPA) study of air quality in 10 public access buildings, more than 500 VOCs were identified.
- Many VOCs have been found to have levels higher indoors than outdoors

Source: Indoor Air Pollution

Thomas G. Robins, MD, MPH

Acute Health Effects

- Mucous membrane irritation
- Shortness of breath
- Allergic responses
- Respiratory tract infection
- Dizziness
- Nausea
- Fatigue

Source: Bureau of State Risk Management
Chronic Health Effects

- Cancer
- Birth Defects
- Reproductive
- Neurological
- Immunological

Source: Bureau of State Risk Management

Contaminant Control Measures

- Source Control
- Substitution
- Limit Exposure Time
- Ventilation Requirements

Source: Bureau of State Risk Management

INDOOR ENVIRONMENTAL QUALITY CREDIT 3.1: Construction IAQ Management Plan: During Construction

Potential Technologies & Strategies

Adopt an IAQ management plan to protect the HVAC system during construction, control pollutant sources and interrupt contamination pathways. Sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wall board.

Test with ventilation - SMACNA

http://www.smacna.org/IAQ/
Indoor Environmental Quality
Credit 4 - Low-Emitting Materials

- 4.1 Adhesives & sealants
- 4.2 Paints & coatings
- 4.3 Carpets
- 4.4 Composite wood-products