

Effects of Air Quality on the Floor

According to the Environmental Protection Agency (EPA), indoor air has higher levels of pollutants than outdoor air, and consequently can pose environmentally related health problems. This has increasingly become a concern for business owners, as indoor air quality (IAQ) has a direct impact on the health, comfort, well-being and productivity of employees. Furthermore, a report from the EPA to Congress reveals that when businesses improve indoor air quality, they can also increase productivity, decrease the number of days that employees miss work and save money on medical care.

IAQ has been a hot topic since the 1970s, as employee health complaints became more prevalent for two main reasons. First, to reduce heating and cooling costs, businesses made their structures airtight with insulation and sealed windows. Consequently, the amount of outside air introduced into buildings was greatly reduced. Second, more chemical products, supplies, equipment and pesticides began to be used in the work environment, increasing employee exposure to poor air environments. In some cases, employees were subjected to excessive tobacco smoke, which can cause secondhand smoke health problems in addition to sick building syndrome (SBS) or building-related illnesses (BRI).

What is SBS?

A workplace is characterized as having problems with SBS when a substantial number of its occupants experience health and comfort troubles that can be related to working indoors. The reported symptoms do not follow the patterns of any particular illnesses, are difficult to trace to any specific source and relief from the symptoms tends to occur when leaving the facility. Employees may experience headaches, eye, nose and throat irritation, dry or itchy skin, fatigue, dizziness, nausea and loss of concentration.

What is BRI?

A workplace is characterized with BRI when a relatively small number of employees experience health problems. The symptoms associated with BRIs are similar to those of SBS and are often accompanied by physical signs identified by a physician or laboratory test. Sufferers of BRI may also experience upper respiratory irritation, skin irritations, chills, fever, cough, chest tightness, congestion, sneezing, runny nose, muscle aches and pneumonia. These symptoms may be caused by the following conditions brought on by indoor air pollutants: asthma, hypersensitivity pneumonitis, multiple chemical sensitivity and Legionnaires' disease. Employees may not experience relief from symptoms when leaving the facility.

What Causes These Diseases?

The IAQ problems that may cause SBS and/or BRI may include the following:

- Lack of fresh air
 - o If insufficient fresh air is introduced into occupied areas of the workplace, the environment can become stagnant and odors and contaminants can accumulate. This is the primary cause of SBS.
- Poorly maintained or poorly operated ventilation systems
 - o Mechanical ventilation systems must be properly maintained and operated based on the original design or prescribed procedures. If systems are neglected, their ability to provide adequate IAQ decreases. For instance, when systems are missing or have overloaded filters, this can cause excess dust, pollen and cigarette smoke to enter occupied spaces, and can cause health problems.
- Disruption of air circulation throughout occupied spaces
 - o The quantity of air depends on the effectiveness of air distribution. If it is disrupted, blocked or otherwise cannot reach occupied areas, air can become stagnant. Walls, dropped ceiling tiles and other obstacles can divert the supply of air in occupied spaces.
- Poorly regulated temperature and relative humidity levels
 - o If the temperature and/or relative humidity levels are too high or too low, employees may experience discomfort, loss of concentration, eye and throat irritation, dry skin, sinus headaches, nosebleeds and an inability to wear contact lenses. If relative humidity levels are too high, microbial contamination can build up and cause BRI.
- Indoor and outdoor sources of contamination
 - o Chemical emissions can contribute to BRI and SBS from cigarette smoke, machinery, insulation, pesticides, wood products, synthetic plastics, new carpeting, glues, furnishings, paints, cleaning agents,

boiler emissions, roof renovations and contaminated air from exhaust stacks. Indoor contaminants may include radon, ozone, formaldehyde, volatile organic compounds (VOCs), ammonia, carbon monoxide, particulates, nitrogen and sulfur oxides and asbestos.

Improve Air Quality

To determine if your facility has poor IAQ, follow standard investigative procedures including:

- Conduct employee interviews to obtain pertinent information regarding the number of employees affected, location and position of affected employees in the building, and employee symptoms.
- Review building operations and maintenance procedures to determine when and what types of chemicals are being used during cleaning, waxing, painting, gluing, roofing operations, renovation, etc.
- Conduct a walk-through inspection to evaluate possible sources that may contribute to IAQ complaints.
- Inspect the HVAC system to determine if it is working properly and is in good condition.
- Review building blueprints of the ductwork and ventilation system to determine if it is adequately designed.
- Conduct air sampling to detect specific contaminants and their levels.

Correcting and Preventing Problems

1. Ensure Adequate Fresh Air Supply

- Create a preventive maintenance schedule and follow it according to manufacturer's recommendations or by accepted practices to ensure that ventilation systems are properly checked, maintained and documented. Preventive maintenance schedules should include inspections of equipment by assuring the following:
 - o Outdoor air supply dampers are opened as they were originally designed and remain unobstructed.
 - o Fan belts are properly operating, in good condition and replaced when necessary.
 - o Equipment parts are lubricated.
 - o Motors are properly functioning and in good operating condition.
 - o Diffusers are open and unobstructed for adequate air mixing.
 - o The system is properly balanced.
 - o Filters are properly installed and replaced at specific intervals.
 - o Damaged components are replaced or repaired.
 - o Condensate pans are properly drained and are in good condition.
 - To achieve acceptable IAQ, outdoor air quality must be adequately distributed at a minimum rate of 20 cubic feet per minute (cfm) per person OR the concentration of all known contaminants should be restricted to specified acceptable levels as identified in the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) "Ventilation for Acceptable Indoor Air Quality" Standard. For more information, visit www.ashrae.org.
 - To determine if the ventilation system is effectively providing adequate fresh air, carbon dioxide levels should be measured. ASHRAE sets the standard of 1,000 ppm of carbon dioxide as the maximum recommended level for acceptable IAQ.
 - If possible, gauges should be installed to provide information on air volumes delivered by supply and return fans.
 - A sufficient supply of outside air should be provided to all occupied spaces. If this is not the case, buildings can be at a negative pressure, allowing untreated air and/or contaminants to infiltrate from the outside. To determine if this problem is prevalent, observe the direction of air movement at windows and doors.
 - Ventilation system filters should have moderate efficiency ratings of 60 percent or more as measured by ASHRAE atmospheric dust spot tests and be of an extended surface type. To determine if the filters have the appropriate efficiency rating, check with the manufacturer. Pre-filters should be used before air passes through higher efficiency filters.
 - Avoid overcrowding employees or patrons in one area or another, and make sure that the proper amount of outdoor air is provided based on the number of occupants.
- #### **2. Eliminate or Control Known and Potential Sources of Contaminants**
- To control chemical contamination:
 - o Use local exhaust ventilation to capture and remove contaminants generated by specific processes, when appropriate. Local exhaust does not re-circulate the contaminated air; instead it directly exhausts the contaminant outdoors. o