

## INDOOR AIR QUALITY GUIDELINES

### OVERVIEW

The purpose of these Indoor Air Quality Guidelines is to provide procedures for CBS facilities to handle indoor air quality (IAQ) concerns in the office, studio, and remote buildings. The guidelines were developed to help you:

- Identify an IAQ concern
- Evaluate the IAQ concern
- Decide when to use air measurements and sampling
- Determine if an outside consultant is needed
- Understand document retention requirements
- Identify resources for additional information

### SCOPE

The main focus in addressing IAQ complaints is to identify the source(s) of the complaint. Leaky roofs, pipes, and moisture-damaged materials can cause mold growth. When left untreated or unabated, IAQ complaints often arise.

The Occupational Safety and Health Administration (OSHA) does not have any specific regulations addressing IAQ situations requiring assessment and abatement. OSHA, however, could become involved if an employee makes an inquiry requesting their assistance in investigating a complaint. Also, OSHA's General Duty Clause requires employers to "furnish to each of its employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to its employees."

## REQUIREMENTS

All IAQ complaints should be taken seriously and brought to the attention of the facility's Human Resources department and building management. The employee should be informed that the complaint has been taken to the building manager and that an investigation is underway.

### Identifying an IAQ Concern

IAQ complaints generally involve nonspecific symptoms, such as: headache, nausea, sinus condition, eyes, nose, or throat irritation, coughing, fatigue, or an uncomfortable feeling. Individuals with allergies, asthma, or other respiratory conditions may be more sensitive to certain contaminants. See Attachment 4 on Indoor Air Quality Complaints and Possible Sources for more detailed information.

As mentioned previously, the employee making the complaint must complete the IAQ Questionnaire for Employees. If more than one person is complaining, interview each individual separately so that answers are unbiased. If necessary, interview other employees to determine if this is unique to an area in the workplace or to a particular individual.

### Evaluating the IAQ Concern

Molds, fungi, and other microbial growth on water and organic sources, which occur naturally outdoors, could become an issue indoors. Mold spore growth has recently been identified as the major source to focus on when evaluating an IAQ complaint assessment.

Identify areas in the suspected location where excess moisture from water leaks has damaged building materials. The tell tale signs of water damage...stains and discoloration... are usually very evident and easy to spot. Because the ventilation system

can distribute contaminants throughout the facility, the cooling coils and condensation drop pans should be carefully checked for excessive water accumulation. **Repair the damage and eliminate the sources of water intrusion as soon as possible.**

It has been determined that approximately 50% of all IAQ complaints can be attributed to insufficient air circulation. Air quality concerns may be caused by a number of factors, such as ventilation system deficiencies, overcrowding, mold, off-gassing of new materials resulting in chemical pollutants, high and low humidity conditions, and ergonomic stressors such as, excessive heat or cold, poor lighting, glare, etc.

Air-conditioning unit filters and ductwork must be inspected and kept clean. The intake vent should provide at least 10-15% fresh make-up air. The location of the intake vents must take into account nearby stacks and vents from paint booths, welding hoods, repair shops, loading docks, restaurants etc. to ensure that contaminants or odors are not drawn back inside the building. Special attention should be given to buildings with fresh air intakes that are close to ground level to ensure that outside air contaminants, such as carbon monoxide, are not drawn into the building's air system.

Animal droppings in ductwork and/or openings in the building crawlspaces can also be a factor in the development of persistent IAQ complaints.

## **When to Use Air Measurement and Sampling**

A good model for determining whether the indoor air quality is satisfactory and comfortable is to take measurements of specific index components in the air, such as carbon dioxide, carbon monoxide, humidity, and temperature. Carbon dioxide (CO<sub>2</sub>) concentration rises as more humans occupy a specific space. The National Institute of Occupational Health and Safety (NIOSH) and the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) recommend keeping airborne levels of carbon dioxide below 1000 parts per million (ppm) because of the correlation with increased discomfort and complaints as the level increases. Carbon monoxide (CO) levels as an indoor air quality measurement should be less than 5 parts per million. The source of carbon monoxide is usually an intrusion into the building of vehicle exhaust or a poorly vented combustion engine or boiler. For comparison purposes, please refer to Attachment 5 for additional information when measuring indoor air quality concentrations.

**We do not recommend collecting or analyzing any type of sample (air, wipe, bulk, etc.) for mold,** primarily because there are no threshold limit values or exposure guidelines. Further, identification of the genus or species is not material. It is important to recognize that mold spores are ubiquitous and naturally everywhere in our indoor and outdoor environments, viewing mold as part of our everyday normal environment.

## **Deciding When and How to Abate an IAQ Concern**

Before beginning any type of abatement, the building owner and/or management should notify the occupants of the abatement plans,

identify the affected areas, and develop a timetable for completion. Effective communication with employees and occupants of the building space is very important to the success of the project.

Procedures should be in place to discard or to dry out water-damaged materials within 24 to 48 hours after flooding to prevent microbial growth. Contaminated materials that cannot be cleaned should be removed from the building in sealed plastic bags. Building materials supporting mold growth must be abated as rapidly as possible in order to ensure a healthy building environment. Fixing the defects that led to water accumulation or elevated humidity should be conducted in conjunction with, or prior to, mold abatement.

## **Determining if an Outside Consultant is Needed**

One of the factors that may determine who will perform the abatement is the type of building materials involved and the size of the project. A large area (greater than 100 sq. feet) of contamination of several wallboards or inside the HVAC system may require outside professional assistance in remediating the mold growth.

If it is determined that an outside consultant is needed to perform a more comprehensive assessment, the facilities and engineering personnel should be made aware of the situation. Reports of site evaluations made by outside consultants should be reviewed by management, and Corporate EHS&S before distribution.

Any air sample data or other sample data that could have an impact on affected employees must be shared with the employee under the OSHA medical and exposure record standard. The chemical products used in any project must be included on the location's chemical inventory list and there must be a current Safety Data Sheet (SDS) per the OSHA Hazard Communication Standard.

## TRAINING

If the abatement is conducted by the building maintenance staff, they must receive specific training on proper cleaning methods, personal protective equipment, and the precautions to take in order to prevent exposure to themselves and other occupants. Personal protective equipment should include respiratory protection such as an N95 disposable dust mask, thin rubber or neoprene gloves, and safety glasses with side shields.

## DOCUMENTATION

Records of assessment and abatement activities, such as air sample data, should be kept indefinitely for evidence that IAQ issues are addressed in an appropriate manner. Records must be maintained of awareness training that has been provided to employees. For any in-house abatement done by building maintenance personnel, records must also be maintained relative to specific training that has been provided. This training may include necessary precautions to prevent exposure to themselves and building occupants and the use of any required personal protective equipment.

Additionally, a current Safety Data Sheet on any chemical products used in the abatement project must be included in the location's chemical inventory.

### Resources for Additional Information

- American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
- American Industrial Hygiene Association (AIHA)
- Environmental Protection Administration (EPA)
- New York City Health Department
- National Institute of Occupational Safety and Health (NIOSH)
- Illinois Department of Public Health (IDPH)
- OSHA – A Brief Guide to Mold in the Workplace

## Attachment 1

### Indoor Air Quality (IAQ) Questionnaire for Employees

Name:
Phone Number:
Department Name:
Location:
Name of supervisor/manager:
Description of problem?
Symptoms, type of discomfort?
When did symptoms/discomfort start?
When are they generally worse?
Time of day, room or area believed to be contributing to the symptoms:
Do symptoms/discomfort go away? If so, when?
Are there events that trigger the symptoms/discomfort (i.e. during and/or following housekeeping/custodial activities)?
Do you have a suspected source or cause of symptoms/discomfort? Yes/No If Yes, please describe:
Do you have any observations about building conditions that might need attention or might help explain your symptoms/discomfort (e.g. temperature, humidity, drafts, stagnant air, odors)?

## Attachment 2

### Indoor Air Quality (IAQ) Questionnaire for Managers/Supervisors

<b>Issues/Observations</b>	<b>Yes</b>	<b>No</b>
Are there noticeable odors in the work area/building? If Yes, suspected type(s):		
Is the work area/building dirty or in unsanitary condition?		
Are cleaning products stored in the complaint area?		
Is there evidence of water intrusion into the work area/building?		
Is there an odor of mold or mildew in or near the complaint area(s)?		
Is there visible mold/mildew growth on building surfaces or fixtures?		
Is there condensation present on the air vents or windows?		
Are there signs of occupant discomfort (e.g. doors propped open, blocked or taped-up diffusers, occupants using fans/heaters or wearing heavier/lighter clothes than normal)?		
Are there signs of uneven temperatures, drafts or sensations of stuffiness?		
Are there signs of recent maintenance/renovation activities in the work area/building?		
Are deodorizers or air cleaning devices used in the work area/building? If Yes, please describe:		
Has the work area/building recently received new building components or furnishings?		
Are office machines (e.g. copying, signature, blueprint, etc.) used in the work area?		

### Attachment 3

#### Indoor Air Quality (IAQ) Questionnaire for Building Management

Issues/Observations	Yes	No
Are there potential sources of contaminated outdoor air (e.g. pollen, blowing dust, vehicle exhaust from parking lots/loading docks, odors from dumpsters, unsanitary debris near air intake)? If Yes, please describe:		
Are pesticides used near any outdoor air intakes?		
Is there standing water on the roof top near an HVAC air intake? If Yes, is there microbial growth present?		
Are there emissions from nearby sources or buildings that can be drawn into the work area/building?		
Is the outdoor air intake located near any contaminant sources? If Yes, please describe:		
Is the outdoor air intake located near any contaminant sources?		
Is the mechanical room dry and free of trash/debris?		
Are chemicals stored in the mechanical room?		
Is there a noticeable odor present in the mechanical room? If Yes, please describe:		
Heating, Ventilation and Air-conditioning (HVAC) Unit(s) number(s):		
In general, does it appear the HVAC unit(s) is being properly maintained and preventive maintenance (e.g. monthly, quarterly, annually) being conducted?		
Is HVAC unit(s) on Energy Management System?		
Is the HVAC mixing chamber free of trash and debris?		
Are the filters clean and free of contaminants?		
Do filters provide complete coverage (i.e. no bypassing)?		
Are turning vanes/dampers operational and free of contaminants?		
Do coils appear clean?		
Is condensate pan accessible for inspection?		

Issues/Observations	Yes	No
Does condensate pan slope toward drain so that it doesn't collect and hold water?		
Is condensate pan free of standing water, slime build-up and rust scale?		
Does the condensate pan appear to be draining properly?		
Are biocide treatments being added to the condensate pan?		
Are fan housing and fan blades clean and free of contaminants?		
Are interior insulation materials damaged? If Yes, please describe:		
Are interior insulation materials dry?		
Are interior insulation materials clean and free of contaminants?		
Is there evidence of refrigerant leaks?		
Is supply duct accessible for inspection?		
Is supply duct damper(s) open?		
Is return air through open plenum or ducted returns?		
As applicable, are return ducts accessible for inspection?		
Are return plenums and/or ducts clean and free of contaminants?		



## Attachment 4

### Indoor Air Quality Complaints and Possible Sources

<b>Complaint</b>	<b>Sources to Consider</b>
There has been an increase in the number of reported illnesses among occupants, especially asthmatic and flu-like illnesses.	<ul style="list-style-type: none"> <li>➤ Visually check for mold or fungal growth in the ventilation system. (Look for standing water under the cooling coils.)</li> <li>➤ Is there evidence of a water leak or water damage in the building? If so remove the damaged material and disinfect the area.</li> </ul>
There have been complaints of headaches, nausea, decreased alertness or the smell of combustion odors, chemicals or other nuisance odors.	<ul style="list-style-type: none"> <li>➤ Possible Carbon Monoxide Exposure. Investigate sources of combustion gases right away. May require air monitoring. Contact EHS department for help.</li> <li>➤ Is the building's air intake near a possible source such as a loading dock or parking garage?</li> <li>➤ Are there any new products in the building such as furniture, carpeting or painting?</li> </ul>
Occupants complain of eye, nose, or throat irritants.	<ul style="list-style-type: none"> <li>➤ Are filters in the ventilation system changed regularly?</li> <li>➤ Is the humidity too low?</li> <li>➤ Is there a dirt buildup around diffusers?</li> </ul>
Occupants complain that the building air is too stuffy or dusty.	<ul style="list-style-type: none"> <li>➤ Has the HVAC system been properly maintained?</li> <li>➤ Check for blocked vents.</li> <li>➤ Is the air intake located near the air exhaust?</li> <li>➤ Is the relative humidity too low or high?</li> </ul>
Occupants complain that the building air is too warm, cool, dry, or humid.	<ul style="list-style-type: none"> <li>➤ Is the relative humidity too low or high?</li> <li>➤ Are building controls set and operating properly?</li> <li>➤ Are there any water leaks or water damage in the building?</li> </ul>

## Attachment 5

### Criteria for Acceptable Indoor Air Quality

<b>Parameters</b>	<b>IDPH</b>	<b>ASHRAE-62.1-2004</b>	<b>Other Sources, (EPA, etc.)</b>
Humidity	20%-60%	30%-65%	
Temperature	68-75 (winter) 73-79 (summer)	68-73 (winter) 73-79 (summer)	
Carbon Dioxide	<800 ppm (preferred)	<5000 ppm	<1000 ppm
Carbon Monoxide	<5 ppm	<9 ppm-(8 hr)	<9ppm (8 hr)-EPA
Formaldehyde	0.1 ppm (office)	.027 ppm(8hr)	0.3 ppm TLV
Ozone	0.08 ppm	0.05 ppm	0.05 ppm TLV
Hydrogen Sulfide	0.01 ppm Sewer gas		
Nitrogen Oxide	0.05 ppm	100 microgram/m <sup>3</sup>	0.05 ppm –EPA
Particulates		0.15 mg/m <sup>3</sup> <2.5 μ particle size 0.05 mg/ m <sup>3</sup> <10 μ particle size	0.15 mg/m <sup>3</sup> (1 yr) or 0.065 mg/m <sup>3</sup> (<2.5 micron particles (24hr)
Lead		1.5 microgram/m <sup>3</sup>	
Radon		4 pico Curies / liter	
Sulfur Dioxide (SO <sub>2</sub> )		80 microgram/m <sup>3</sup>	