



# **Indoor Air Quality Guideline**

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## INTRODUCTION

The purpose of this guideline is to provide a detailed process to address indoor air quality (IAQ) factors at Government of Alberta occupied facilities. The guideline has been developed by a technical sub-committee of the Interdepartmental Committee on Indoor Air Quality chaired by Alberta Infrastructure.

It is recommended that IAQ management in Government of Alberta buildings occur on both a proactive and reactive basis. A proactive process involves utilization of a preventative maintenance program in relation to a building's operating systems, periodic testing of indoor air quality comfort parameters and a review of indoor air quality associated factors when renovations are undertaken. The reactive process typically involves responding to occupant indoor air quality concerns.

## PROACTIVE PROCESS

The intent of a proactive approach is to provide a healthy work environment. A proactive indoor air quality monitoring process provides several opportunities for technical and building maintenance staff to assess the building's operating systems and indoor air quality conditions. A proactive process should include the following:

- A regularly scheduled preventative maintenance program to ensure the heating, ventilation and air conditioning (HVAC) systems operate at design specifications as per Alberta Infrastructure's preventative maintenance program.
- Review and evaluation of IAQ and HVAC systems as part of Alberta Infrastructure's facility evaluation program.
- Submission of IAQ investigation results to Alberta Infrastructure's facility evaluation program.
- Periodic testing for comfort factors as per Appendix 2 – Level 2 by suitably trained building managers. Frequency of this testing is variable, depending on a variety of factors including age, type, and location of the building and history of occupant concerns. Testing frequency to be determined by the building manager.
- Consultation with Alberta Infrastructure's Technical Services Branch on design of equipment installations for special processes, major renovations and new construction to address factors that may impact the IAQ of the facility. These factors should include but are not limited to building envelope, HVAC systems, isolation of work area(s) and building materials. This is best done prior to construction or occupancy.
- Periodic inspection by building managers of building cleanliness and review of cleaning products and procedures.

### REACTIVE PROCESS

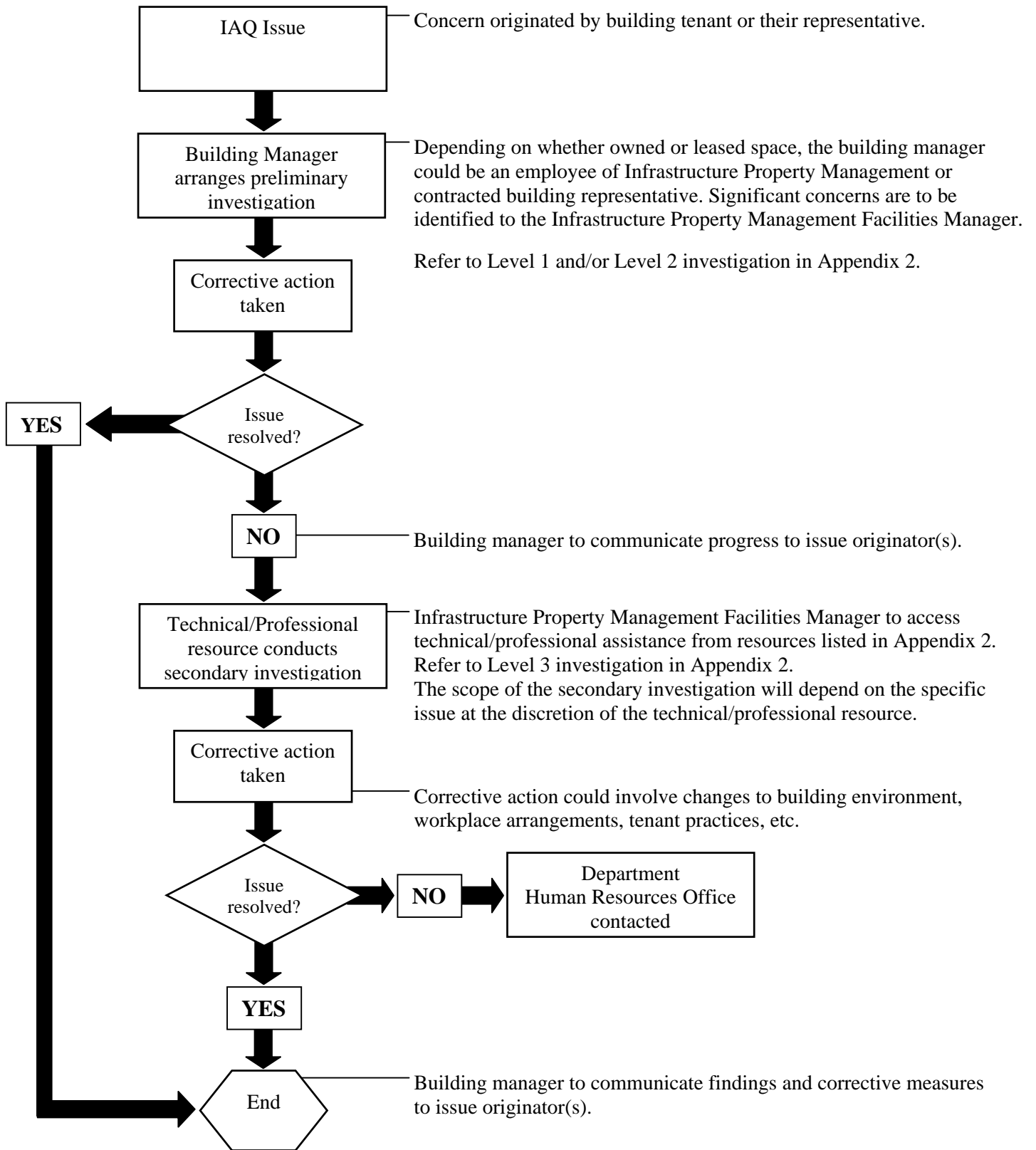
The reactive process involves responding to an expressed concern in relation to the building's indoor air quality. The concern may be communicated through a variety of channels, but needs to be directed to the building managers for their attention. Appendix 1 provides a flowchart of the steps involved in this process.

The Building Manager will review and investigate the concern. This would normally include a Level 1 and/or Level 2 investigation as outlined in Appendix 2. Based on the results of the investigation, the building manager would take action to address the concern, or proceed to Level 3 Investigation and seek assistance from technical/professional resources described in Appendix 2.

When dealing with a concern it is important that the response and related activities are communicated to the individual. It should be made clear that the complaint is taken seriously, action is being initiated and the status toward resolution explained. Open communication and sharing information are essential to a successful response.

If, at any point during the IAQ Concern Process, a dispute arises, it may be referred to the department's Human Resources Office for investigation and response.

## Appendix 1 - IAQ Issue Process



**If the issue is not resolved by this process, it may be brought to the attention of Workplace Health and Safety (HR&E) or the Regional Health Authority.**

### LEVEL 1 – WALK-THROUGH SURVEY:

#### 1. Information Gathering

- Meet with the employee(s) and/or supervisor of the area with the concern and the building operator/facility manager. Gather as much information as possible about the nature of the concern to identify possible sources of concerns.

#### 2. Conduct Physical Inspection

- Identify potential hazards (i.e. sources of airborne contaminants from processes, e.g. blueprinting machines, combustion sources, etc.) by visual inspection.
- Look for signs of water leakage and water condensation, as they may be indicators of potential mould contamination. Ask about history of water leaks/damage. For additional information about mould refer to Appendix 4.
- Look for maintenance and housekeeping deficiencies (e.g. missing fan belts/filters on ventilation systems, humidifiers (drain pans) and cooling systems, boxes stored against cold walls, thermostats set or located improperly, etc.).
- Review air intake and exhaust locations, HVAC system operation schedule and minimum outdoor air requirements.

*A checklist to assist with the walk-through can be found at the end of this Appendix.*

#### 3. Corrective Action

- Take appropriate corrective action to resolve the concern.
- If the results of the walk-through survey do not resolve the issue then proceed to Level 2 investigation

### LEVEL 2 – TEST FOR COMFORT FACTORS

After the Level 1 investigation, the building manager arranges testing for comfort factors, i.e. carbon dioxide, temperature, relative humidity and in some cases, for carbon monoxide. These tests should be conducted by suitably trained individuals and should include the following considerations:

#### 1. Test Plan

- Testing should be conducted in area(s) of concern and area(s) of no concerns (i.e. control sample). A representative number of samples are required to ensure all areas of concern have been addressed. Consult with a technical/professional resource to determine the appropriate number of samples and sampling locations.
- If spot readings are taken, then ensure this is done at different times of the day to capture possible variances.
- Outdoor weather conditions (temperature, relative humidity) should be noted whenever testing for IAQ comfort factors.
- Testing for carbon monoxide should only be done if potential sources are identified (e.g. vehicle exhaust, combustion-type heating sources).
- Refer to Appendix 3 for Indoor Air Quality and Comfort Parameters.

### **Corrective Action**

- Based on the results of the investigation, identify corrective action. If you are uncertain, this should be done in consultation with the technical/professional resources identified below.
- If the results of Level 2 investigation do not resolve the concern, proceed to Level 3 investigation.

### **LEVEL 3 – OBTAIN ASSISTANCE FROM TECHNICAL/PROFESSIONAL RESOURCE**

If the IAQ issue is not resolved after conducting a Level 2 investigation, obtain assistance from a technical/professional resource listed below.

The type of scenarios where this assistance should be obtained include:

- Interpretation of results from Level 1 & Level 2 investigations.
- Dealing with potential or known existence of mould contamination.
- Further sampling for other possible contaminants such as volatile organic compounds, formaldehyde, particulate, etc.
- Asbestos management/contamination.
- Evaluating the amount of emissions from processes (e.g. blueprinting, drycleaning from nearby commercial operations, etc.).

**Note:** Levels 1-3 apply to all indoor air quality assessments (proactive and reactive).

### **TECHNICAL/PROFESSIONAL RESOURCES**

IAQ investigation should be conducted by:

#### **Level 1 & Level 2**

- Suitably trained individuals (e.g. Property Management Staff) in consultation with those listed below.
- Alberta Infrastructure Technical Services Branch
- Alberta Corporate Service Centre OH&S staff.
- Personnel Administration Office (PAO) Occupational Hygienists.
- Private sector Occupational Hygiene and Environmental Consultants recommended by PAO.

#### **Level 3**

General qualifications for people doing Level 3 testing would include but not be limited to Certified Industrial Hygienists (CIH), Registered Occupational Hygienists (ROH), Certified Industrial Hygiene Technologist (CIHT), Registered Occupational Hygiene Technologist (ROHT), and Certified Public Health Inspector of Canada CPHI(C).

## IAQ Walk-Through Checklist

**Location:** \_\_\_\_\_

**Department:** \_\_\_\_\_

Item	Yes/No	Comments
<b>Occupied Spaces</b>		
Concerns/symptoms from occupants.		
Are there complaints of too hot or too cold?		
Are occupants using portable fans, humidifiers?		
Any noticeable odours?		
Is it stuffy?		
Any obstructions (partitions, screens) blocking ventilation grills, thermostats?		
Any signs of inadequate cleaning?		
Is there any air movement through the supply diffusers?		
Are there dust marks around ceiling diffusers or return air grills?		
Does glare appear to be a problem?		
Any cleaning chemicals? Pesticides/herbicides for indoor plants?		
Any office equipment that may require special ventilation?		
Are there any visible signs of water leakage or condensation?		
<b>Ventilation System</b>		
Air intake locations close to potential contaminant sources, e.g. building exhaust, loading dock, boiler exhaust, washroom exhaust?		
Humidification system? Drain pans clean?		
Filters in the ventilation system?		
<b>Carbon Monoxide – Combustion Products</b>		
Does the building contain an internal parking garage?		
Does the building contain an internal loading dock?		
Does the building contain a gas-fired heating system?		

Completed by: \_\_\_\_\_

Date: \_\_\_\_\_



## Appendix 3 - Indoor Air Quality and Comfort Parameters

These parameters are intended to provide employees with a comfortable and healthy indoor work environment and should be applied by individuals who are trained to conduct IAQ investigations and interpret the results (i.e. technical/professional resources in Appendix 2).

Carbon Dioxide*	800 ppm <sup>(1)</sup>	
Carbon Monoxide	5 ppm <sup>(1)</sup>	
Temperature*	22°C with a 2°C upswing at peak outdoor design temperature (summer) in air-conditioned buildings.	
Relative Humidity*	20% at outdoor temperature of -35°C 30% at outdoor temperature >0°C 60% maximum	} May not be achievable in some buildings due to design limitations.
Total Dust	100 ug/m <sup>3</sup> <sup>(2)</sup>	
Total Volatile Organic Compounds	5 mg/m <sup>3</sup> <sup>(3)</sup> (Health Canada – Indoor Air Quality in Office Buildings: A Technical Guide)	
Formaldehyde	0.10 ppm	
Nitrogen Dioxide	0.3 ppm (1/10 <sup>th</sup> the O.E.L.)	
Asbestos	0.05 f/cc <sup>(4)</sup> (1/10 <sup>th</sup> the O.E.L.)	
Ozone	0.01 ppm	
Radon	150 Bq/M <sup>3</sup> <sup>(5)</sup> (annual average)	
Office Lighting	500 – 750 Lux (maintained)	
Computer Lighting	300 – 500 Lux (maintained)	
Background Mechanical Noise Levels		
- General office area	48 dBA	
- Private office	45 dBA	
- Board Rooms	40 dBA	
Airborne Fungi	150 CFU/M <sup>3</sup> <sup>(6)</sup> (3 or more species reflective of outdoor flora)	
(Health Canada Guidelines)	50 CFU/M <sup>3</sup> <sup>(6)</sup> (only one species other than cladosporium or alternaria) Up to 500CFU/M <sup>3</sup> <sup>(6)</sup> (summer if the species is primarily Cladosporium or other tree/leaf fungi). <b>The indoor air should normally be qualitatively similar but quantitatively lower than outdoor air.</b>	

Notes: (1) The above listed levels were developed from the Occupational Exposure Limits. For substances other than the ones listed above, a level of 1/10<sup>th</sup> of the Occupational Exposure Limit as identified in the Chemical Hazards Regulation of the Occupational Health and Safety Act, should be used as a guideline.

(2) Relative humidity and temperature guidelines have been adopted from Infrastructure's Technical Design Requirements for Alberta Infrastructure Facilities .

(3) References used include applicable Health Canada guidelines and comfort levels established by the American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE).

(4) \* Comfort parameters.

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<sup>1</sup>ppm = parts per million

<sup>2</sup>ug/m<sup>3</sup> = micrograms per cubic meter

<sup>3</sup> mg/m<sup>3</sup> = milligrams per cubic meter

<sup>4</sup>f/cc = fibers per cubic centimeter

<sup>5</sup>Bq/M<sup>3</sup> = becquerel per cubic meter of air

<sup>6</sup>CFU/M<sup>3</sup>= colony forming units per cubic meter of air

Alberta Infrastructure has adopted the Health Canada, [“Fungal Contamination in Public Buildings: A Guide to Recognition and Management”](#) and the New York City Department of Health, [“Guidelines on Assessment and Remediation of Fungi in Indoor Environments”](#). For more information on the subject, refer to these documents.

Mould (fungi) is everywhere, indoors and outdoors, varying with the seasons. There are thousands of species of mould. It is most likely to grow where there is water or dampness.

When moulds are disturbed, spores (like seeds) are released into the air. If people inhale, handle or ingest spores, then they are exposed to potential concerns.

People are exposed to mould every day, and most moulds are not a risk to healthy people. Each person is different; what may be too much exposure to some may be no concern to others. Exposure may cause or worsen asthma attacks, hay fever or allergies. Symptoms can include constant cough, congestion, runny nose and eye irritation depending on exposure and vulnerability. Fever and breathing problems can occur but are unusual.

Moulds need water to grow. Water damage, high humidity or dampness can initiate mould growth. Removing the source of moisture is most important in preventing mould growth.

If mould is found, the best and simplest approach is to eliminate the source of water and clean the affected area as soon as possible. Small areas (less than one square meter or ten square feet) may be cleaned by using detergent or bleach solutions. Wear suitable respirator, eye protection, and gloves. (Consult a qualified hygiene professional for advice on appropriate protective equipment. See list of qualifications at the bottom of page 5 of the main Guideline document.) Thoroughly dry the area after cleaning. Cleaning should be done by people without symptoms and cleaning rags or sponges disposed of. Contaminated materials that cannot be cleaned (e.g. deteriorated drywall or wood) should be removed from the building in a sealed plastic bag. If mould returns or spreads, or the contamination area is more extensive than one square meter, seek professional help as indicated in the Guideline.

If you believe you have symptoms caused by exposure to mould see a doctor. Remember, similar symptoms can be caused by many other illnesses. For more information call your local health authority.