Indoor Air Quality Test Protocol for Highrise Residential Buildings

Introduction

The maintenance of acceptable indoor air quality in highrise residential buildings requires proper construction and monitoring of the building and its systems. Contaminant sources from construction-related materials and occupant-related activities must be kept to a minimum. Existing airborne pollutants must be collected and eliminated in an appropriate manner. Adequate levels of fresh air ventilation must also be provided.

Occasionally, it is necessary to conduct an overall assessment of air quality in a building. Thus, Canada Mortgage and Housing Corporation (CMHC) commissioned a study of the general protocol to be followed for the assessment of indoor air quality in highrise residential buildings. The results of the investigation were compiled in the form of a manual that may be used to assist investigators in this task.

Overview of the Manual

CMHC retained Buchan, Lawton, Parent Ltd to outline the basic procedure for evaluating indoor levels of pollutants. The investigation of indoor air quality was divided into three stages:

- preliminary assessment;
- simple measurements; and
- complex measurements.

The preliminary assessment consists of site inspections and the identification of potential problems and/or complaints. Simple measurement techniques are those which a technologist could undertake, providing that the appropriate equipment is available. The more complex measurements are those which may require the services of a professional in the field and, thus, may be more costly. Generally, complex measurements are only pursued if the first two stages fail to identify causes to the detected problems.

The manual is organized into three sections that address the above-mentioned stages in the assessment of air quality. Section 2.0 describes the preliminary assessment and particular contaminants of concern. Section 3.0 provides checklists to assist in the initial assessment process. Section 4.0 outlines useful, simple or complex testing techniques that identify specific problems.

Preliminary Assessment

The first stage in the evaluation of indoor air quality involves the collection of information that could identify potential pollutants and their sources. This is accomplished in three steps:

- occupant response sampling;
- pollutant source identification; and
- general mechanical systems observation.

Some useful tools are suggested for assisting in this stage. Occupant feedback from interviews, questionnaires, and record of complaints are helpful to reduce the investigative efforts required. Common sources of pollutants may be identified from building plans or visually during a building walk-through. Several of these sources are listed, along with the nature of their respective contaminants. Lastly, the general condition and operation of the mechanical systems must be examined. Particular points of concern that may reveal some general problems are mentioned in this section.

This section also addresses several specific pollutants (e.g. CO, formaldehyde, VOCs, asbestos, etc.). Potential sources and/or sites of entry are described, as well as any structural or physical symptoms associated with exposure to a given contaminant.

Assessment Checklists

This section of the manual contains two checklists--one to be completed by the investigator conducting the building assessment and the other to be completed by the occupants.

Cette publication est aussi disponible en français sous le titre : *Protocole d'essai de la qualité de l'air intérieur des tours d'habitation*

The building assessment checklist comprises 40 questions that address three areas of concern:

- building common areas;
- mechanical systems and HVAC operation; and
- individual apartment/complaint areas.

The occupant questionnaire addresses particular complaints that may be indicative of specific problems related to the quality of the indoor air.

This section concludes with a summary, to assist in the interpretation of the responses to the checklists. In general, three factors must be considered prior to determining whether an air quality problem warrants further investigation. These are referred to as PIP--people, inadequate ventilation, and pollutants. The notes outlined for each of the questions on the assessment form serve to provide some guidance in this decision process.

Measurement Methods

Often, the findings of the preliminary assessment reveal those contaminants that pose a particular problem and warrant monitoring. For this reason, the manual provides a list of suggested measurement capabilities suitable for a broad range of buildings. These have been selected for relevance, accuracy, level of simplicity, and cost. Specific equipment is described for the measurement of the contaminants mentioned in Section 2.0.

The manual also provides guidelines in the event that the investigator is required to carry out simple testing in the building. Suitable control and testing locations, as well as ideal times for measuring specific pollutants or parameters, are listed. Furthermore, this section provides a general discussion of the factors that may influence the measurement process, to ensure the collection of accurate and meaningful data.

Section 4.0 also offers information on the contaminants discussed in the report and the measurement procedures suggested by Buchan, Lawton, Parent Ltd and the Architectural and Building Services Division of Public Works Canada. Anumber of optional instruments and methods are described for each pollutant, in addition to "user notes" that offer some guidance on the use of the instrument/method for measuring indoor air contamination levels.

In certain cases, further investigative efforts are necessary. These often rely on the services of a professional, which may require additional costs. Generally, these more complex measurement techniques are not suggested for most applications and are usually carried out only when a problem is suspected following the preliminary assessment.

Summary

This manual provides a protocol for the three stages involved in the assessment of indoor air quality in highrise residential buildings. It serves to assist investigators in the identification of potential problems and in the determination of the appropriate course of action once contaminant levels are suspected.

Although the guide outlines several suggestions for Indoor Air Quality assessment, the process relies heavily on the abilities of the technologist to gather information from various sources and to make informed decisions on the need for further investigations. Thus, an investigator must be knowledgeable, observant and resourceful. Amanual, such as the present, may be used as a valuable tool to assist the technologist in his/her task.

Project Manager: *Jacques Rousseau*

Research Consultant: *Buchan, Lawton, Parent Ltd*

Research Report: *Indoor Air Quality Test Protocol for Highrise Residential Buildings, 1990*

A full report on this research project is available from the Canadian Housing Information Centre at the address below.

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