Research & Development Highlights

96-202 Technical Series

A SURVEY OF PROBLEM HOMES OF THE ENVIRONMENTALLY HYPERSENSITIVE

Introduction

This project was initiated as part of a process of developing standardized procedures for inspecting homes for indoor air quality problems. Numerous requests received by CMIIC from homeowners seeking assistance in dealing with a variety of indoor air problems had resulted in a draft inspection protocol to use in investigating homes. Its aim is to identify both the sources of contamination and the solutions to improve the indoor air of these houses. This draft, however, required further development and testing.To test the protocol, homes of environmentally hypersensitive individuals were selected.

Research Program

Objectives for this project included:

- development of the inspection protocol;
- identification and documentation of "sick" houses;
- identification of sources within the house as well as any trends;
- remediation strategies for each home; and
- protocol evaluation.

Investigations were carried out in 15 houses - *5* from Nova Scotia and 10 from Ontario. To test survey repeatability, 3 houses were investigated by 2 different investigators on separate occasions.
The primary criterion for selecting houses for the survey was that the house was suspected of causing or exacerbating health problems of the occupants. Other criteria were; urgency of the problem, occupant commitment, type of house, number of people affected and location.

Survey forms for the investigator included an occupant survey form and inspection checklists.

Investigators included a builder, renovator, consultant and an engineer. Most had experience in housing for the environmentally hypersensitive.

The information collected from two house investigations were reviewed by independent consultants with expertise in healthy housing, to determine if the information was thorough and clear enough to permit an evaluation without a house visit.

Summaries were prepared from the responses provided by the fifteen homeowners and from the observations compiled by the investigators.

Findings

Nine houses were found to have predominantly moisture and mold problems. In these houses, chemical contaminants were also identified, but

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these were found to be less significant than molds. Five houses had predominantly chemical contamination, while one house had both mold and chemical contaminants of about equal importance. The nine moldy houses were older, ranging from 15 years to *154* years old. Three of the five houses with predominantly chemical contaminants were new (under ten years old), while two were older (over forty years old). The house that had mold and chemical contaminants was new (two years old).

All the houses, except one of the new ones, had a basement and/or crawl space. All had large areas of carpeting with some vinyl flooring. Pets were present in nine households. Exposed fibrous insulation material was found in more than half of the houses. Poor drainage and poor air movement outside the house were also observed in half of the houses.

Sources of contaminants in all the test houses were identified. Earthen basements or crawl spaces were the primary source of molds in four houses. An open well inside two houses was also identified as a point source of moisture. Previous history of water leakage in the house envelope, capillary rise of moisture through the concrete floor, high moisture levels generated by the occupants or by previous use of humidifiers, lack of dehumidification in the warm months and poor construction quality leading to localized condensation were among the factors found to contribute to moisture problems. An indoor pool in the two-year old house led to elevated humidity levels in the house, causing mould growth and enhanced chemical emissions from building materials. Furthermore, chlorine gas from the pool was detected in the living areas.

Building materials and furnishings were the primary sources of chemical contaminants. Carpets and underpads and medium density fibre board subfloor, paneling, cabinets and furniture were found in all of the houses. Household chemicals, scented personal products and hobby materials were additional sources of chemical contamination.

Ventilation was found to be lacking or inadequate in all of the houses. Lack of ventilation was indicated by stale air, moldy or chemical odours, lingering cooking odours and pet odours. Two houses had a heat recovery ventilator (HRV), but because of improper installation, the full benefits from having one were not gained. It was also evident that the presence of an HRV did not solve the indoor air problems of these houses.

An odour was detected by the investigators in every house upon entry. Some clearly had stronger odours than others. In comparison, only four out of fifteen homeowners reported noticing an odour in their own house upon entering.

Contamination levels in some of these houses were high enough to cause severe discomfort to the investigators. The symptoms reported after a short period of exposure included breathing difficulties, dizziness, disorientation, headaches and itchy skin. In one case, the investigation had to be discontinued owing to the severity of the adverse reactions.

Remediation suggested for the houses ranged from simple to extensive. In two houses, it was questionable whether the air quality could be improved due to the extent of the problems - previous fire damage, moldy basement, poor structure overall.

The survey tools received a mixed review from the reviewers and investigators. In many instances the investigator's expertise was such that they relied more on their own investigative instincts rather than on the surveys.

Results of the Protocol Evaluation

It was generally felt that while being extremely thorough, the Inspection Checklist was too lengthy and difficult to complete. The level of detail was, however, felt necessary to provide a complete assessment of all areas of the house, as well as to permit a comparison of results with other houses.

Feedback from team members after applying the protocol in the first few houses resulted in improvement of the format.

The duplicate investigations in Nova Scotia were dissimilar in their assessment while the duplicate investigations in Ontario showed the same results. These findings indicated a need for a consistent level of training prior to conducting IAQ investigations.

Implications to the Housing Industry

This work demonstrates the feasibility of investigating indoor air quality problems in homes. The survey of fifteen houses showed the severity of the problems in many of these houses. Previous CMHC research indicates that a significant percentage of Canada's housing stock share some of the problems noted in the survey. The investigation protocol is useful, but the expertise of the investigators is much more important. A need for a program to train investigators was identified.

Project Manager: Virginia Salares
***Research Report: A** Survey **of Problem Homes of** the Environmentally hypersensitive (1996)*
Research Consultant: Drerup Armstrong Ltd

The remediations suggested from individual investigators were often incomplete and were supplemented by other members of the team. The use of odour detection was pointed out by the external reviewer as a possible health risk for the investigators.

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

Housing Research at CMHC

Under Part IX of the National Housing Act, the Government of Canada provides funds to CMHC to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research.

This factsheet is one of a series intended to inform you of the nature and scope of CMHC' s technical research program.

*The **Research and Development Highlights** factsheet is one of a wide variety of housing-related publications produced by CMHC.*

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