RESEARCH HIGHLIGHTS

Technical Series 99-101

A STUDY OF RECURRING MOLD PROBLEMS ON THE ROSEAU RIVER RESERVE, MANITOBA

Introduction

The flooding of the Red River in 1997 forced the evacuation of the Roseau River Anishinabe First Nation Reserve from April 23, 1997 to May 22, 1997. Below grade basement seepage along with some sewage back-up occurred despite the dike surrounding most of the 204 homes. Sump pumps could not be used because the electricity was shut off for safety reasons during the course of the evacuation. Of more than 114 flood damaged houses, at least 53 houses were identified as contaminated with unspecified molds, and 34 other homes contaminated with Stachybotrys chartarum, a mold that has caused health problems in other incidents. Despite the cleaning and renovation of some basements, mold was still detected in the basements.

Research Program

The purpose of this research was to investigate the recurring mold problems at the Roseau River Reserve. Eight flood damaged houses were chosen and investigated for indoor air quality problems. The study was conducted from April 15, 1998 to April 18, 1998, using the CMHC Indoor Air Quality Investigative Protocol. Each house was examined following the IAQ Problem House Survey protocol through an inspection of the exterior, basement, mechanical system, kitchen, bathrooms and other rooms. Different levels of recommendations to improve indoor air quality were then detailed for each house.

Findings

There were many common factors causing mold and indoor air quality problems:

- most of the occupants were smoking in their homes;
- the site, a flood plain, was poorly drained;
- all the houses were built with basements;
- the only measure preventing the entry of groundwater, or even sewage backup, was the use of sump pumps (below grade flooding occurred when power was lost);
- poor construction techniques such as no eavesthroughs, or downspouts directed onto the foundation, and improper grading around the house increased the likelihood of water entering the foundation;
- the practice of insulating and finishing basements in the interior created hidden cavities for molds to grow;
- high occupancy rates increased the moisture levels in some homes;
- most of the houses did not have adequate ventilation; and
- inadequate building maintenance, in the form of missing shingles, broken windows, poor sealing around windows and doors and/or incomplete repairs, enhanced water penetration and mold problems.

It appears that the mold contamination was not due to the flooding alone. Mold contamination could have been present before the flooding as a result of poor construction and maintenance.

The houses that have suffered flooding or seepage problems in the past are at risk of having problems again. Houses on the more poorly drained sites on the reserve are at greater risk of flooding or seepage. Deeper foundations are more likely to have greater moisture problems than the shallower foundations.

Renovation After the Flood

The remediation carried out after the flood did not address the sources of the moisture in the basements. Proper procedures for cleaning up molds also were not followed (see CMHC booklets Cleanup Procedures for Mold in Houses and Toxic Mold Cleanup Procedures).

Although seven of the eight houses investigated had been renovated prior to this study, all eight houses continue to be a concern regarding mold contamination. The documentation from the renovation indicated that chemicals other than bleach were used in the clean up. Mold was visible in the houses that

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had been cleaned. In one house undergoing renovation, moldy insulation behind the walls was not removed. Necessary repairs that would reduce moisture entry to the houses were not carried out.

The investigations confirmed that mold remediations previously undertaken were ineffective. Based on these eight houses, all houses that have previously been identified as contaminated with Stachybotrys chartarum or any other molds must be considered to be still contaminated.

A dramatic shift in focus is needed to rectify these recurring mold problems. First the existing mold must be thoroughly removed, then renovation must be undertaken to eliminate the sources of water and contamination.

Renovation of Houses to Prevent Recurring Problems

Mold will return if given the following conditions: availability of moisture, food and appropriate temperature. Molds can grow at temperatures suitable for people. Almost any construction material is food for molds. The only factor that can be controlled is moisture. Some recommendations to control moisture include:

- stop water leaks through any part of the building envelope;
- reduce bulk seeping water into the foundation by improving grading and appending downspouts;
- reduce cold surfaces which can lead to condensation and mold growth;
- gain more control over random air leakage, leading to more control over the indoor air;
- manage the relative humidity;
- exhaust stale air and supply fresh air; and
- circulate the fresh air to all living spaces.

The primary strategy to adopt in the renovation of moldy houses is the prevention of moisture from coming in through the building envelope. Occupants must maintain the house to manage moisture inside the house. Finishing the basements should not be a priority. It would be more iuseful to insulate the exterior of the foundation rather than the interior to eliminate hidden cavities where molds can grow.

Recommendations for New Construction

Ideally new houses should not be built in flood plains. Any new construction should be built to R-2000 standards. When homes are built in poorly drained areas, the houses should be built without basements or crawlspaces and raised above the existing water table. In sum, new houses should be suitable for the high occupancy rate, poor drainage and cold climate of this community.

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Research report: A Study of Recurring Mold Problems on the Roseau River Reserve, Manitoba, 1998

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A full report on this project is available from the Canadian Housing Information 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 fact sheet is one of a series intended to inform you of the nature and scope of CMHC's research report.

To find more *Research Highlights* plus a wide variety of information products, visit our Website at

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