

# Missteps with Mold

*Building professionals should follow a thorough mold and IAQ investigative protocol when they tackle mold remediation cases.*

by **Bill Boles**

In the summer of 2001, a First Nation community north of Lake Superior in Ontario, Canada, declared a state of emergency due to mold problems that were perceived to be life threatening. The community consists of about 84 single-family homes, three duplexes, and one fourplex. The First Nation had become concerned about mold in houses in early February. In response, the Ojibway tribe hired a consultant to inspect 13 units and conduct air sampling in 4 of them. As a result, those four units were evacuated. That consultant recommended further air sampling and investigation. This sampling was conducted by local health service providers. Based on these results, the Chief and Council decided to evacuate approximately 200 people from 45 homes. A private engineering firm's initial report suggested that 69 buildings be replaced and 19 repaired for an estimated cost of CAN \$8 million.

In any evacuation crisis, particularly in an isolated community, housing is at a premium. To deal with this crisis, evacuated families were housed with other families in the community, in local motels, and in replacement trailers. Overcrowding in First Nation communities is a common problem, and it contributes to an overload of moisture and subsequent mold problems in houses. Ironically, the evacuations that were ordered in response to this mold crisis resulted in more overcrowding and excessive storage, which contributed to subsequent mold problems in homes that had not been evacuated. The tribe had also purchased a number of used,



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20-year-old trailers on very short notice, to alleviate the housing shortage. At the height of the crisis in this community, about CAN \$100,000 per week was being spent on temporary accommodations and services. For that amount, it would be possible to build one new house per week.

## *Skilled Observation Is Key*

Indian and Northern Affairs Canada (INAC) is the Canadian government department that administers funds for aboriginal housing. Canada Mortgage and Housing Corporation (CMHC) is the Canadian government housing agency. With the approval of the First Nation, INAC and CMHC approached me in mid-July to provide technical

assistance to further investigate the problems. Because I have helped CMHC develop their investigative protocol and their training program, CMHC asked me to lead a team of three inspectors from aboriginal housing organizations to investigate a sample of houses from the affected community. I think that it's important to involve regional housing people in these emergencies so that they can gain valuable experience, rather than just parachuting a specialist in to work alone. The community housing manager selected 21 houses and two replacement trailers to be investigated. About half of the investigated houses were ones that had been evacuated due to mold contamination.

It has been my experience that a skilled observer can conduct a

thorough, methodical investigation using only the minimal tools that are necessary to increase observational abilities and to provide personal protection. Home inspection tools that I typically use include investigation forms, a clipboard or binder, a pen, a good flashlight, a stepladder, a drop cloth, goggles, a dust mask, a half- or full-face respirator, disposable coveralls (Tyvek suit), a tape measure, a garbage bag (for rough air flow measurements), a multi-tool and a thermohygrometer. It's also nice

ings to gain a house-as-a-system perspective. In my final reports, I provide a prioritized set of recommendations, with the actions that are absolutely necessary clearly identified.

By following this investigative protocol, our inspection team arrived at conclusions that were substantially different from those of the other involved parties. Although a few homes had moderate to severe mold contamination, most homes had only small areas of mold. Typically, homes

small drywall core samples of obviously moldy areas, but did not document the areas of visible mold or their extent. We were not surprised to learn that toxigenic molds were found growing on the paper face of the drywall. This is very common. However, professionals use sampling and interpretation guidelines to help determine the existence and amount of mold growth. The guidelines are not based on safety or health risk. Knowing the type of mold that is present doesn't tell you the degree of health risk that is faced by the occupants, some of whom may be very old or very young, or may already have compromised immune systems. Furthermore, mold sampling is expensive.

After a preliminary look at the mold sampling data, Dr. David Miller, a noted Canadian mold expert from Carlton University and Health Canada, reported, "The bulk samples are of little value absent accurate assessments for the area of visible mold and identification of species." Thus, the data were insufficient to allow anyone to decide how best to respond to mold contamination in these houses.

Since we cannot assess health risk, the next best thing to do is to categorize the level of care to be taken during remediation. Generally accepted small-scale residential remediation methods do not change based on the species of mold. Both CMHC and other agencies accept this concept. *The Guidelines on Assessment and Remediation of Fungi in Indoor Environments* developed by the New York City Department of Health are an excellent example of this approach. Since we know that mold growing on drywall is highly likely to be one of the toxigenic species, and since level of care during remediation is based on area, it makes far more sense to measure areas of visible mold rather than to do any sampling. No one can define exactly how much mold is growing in hidden cavities without actually looking. However, IAQ investigators who have a solid background in building systems can often find moisture pathways that, in conjunction with other evidence, allow them to suggest whether further investigation is warranted. No matter



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One of the replacement trailers had extensive areas of mold under the carpet.

to have a smoke pencil, an inspection mirror, binoculars, a surface moisture meter, a pin-type moisture meter, and a CO detector. Inspectors all have their own preferences. None of the readings from any meter or detector should be specifically reported unless a thorough test protocol is followed using a calibrated instrument, and the results are clearly documented.

If the investigator's aim is to create an action plan to solve a problem, it's trends, not numbers, that are important. The purpose of the on-site investigation is to gather evidence that then allows thoughtful decisions to be made. Snap decisions are inappropriate. Following the site visit, you must analyze the find-

ings with small mold areas can be cleaned up without the need for evacuation. There is usually little disruption to family life.

From my perspective, the technical basis for many of the evacuations that had been ordered was unclear. There was no evidence that the air samples had been collected or identified according to accepted protocols. Both Canadian and American Industrial Hygiene Association (AIHA) guidelines say that air sampling data can be used to direct physical investigations, but that they provide little indication of exposure and that they should not be used to assess risk.

The local health services provider had conducted bulk mold sampling by taking

what the area or species of mold growth, it should be cleaned up and prevented from recurring. Why not just get on with it?

If residents are going to be put through an expensive and difficult evacuation, their new housing units should, at a minimum, be healthier than the ones they left behind. However, both of the trailers that we inspected had mold problems. In one, the mold was extensive. Relocating residents from homes with small areas of mold to trailers with larger areas of mold was an expensive exercise that did nothing to protect these people's health.

Compounding their troubles was what was probably happening inside their evacuated homes. Once evacuated, the boarded-up houses had even less air circulation and ventilation than they had had when they were occupied. Mold contamination could therefore be expected to increase, causing even more damage and cleanup expense.

## No Quick Fixes

There is rarely a single, quick fix for IAQ problems. I follow a lower-cost (under \$100), medium-cost (\$100-\$1,000), and higher-cost (more than \$1,000) report format in order to provide the client with a range of options. Usually, a number of recommendations, following a house-as-a-system approach, must be implemented. Recommendations that are essential to solving the problems are identified in the report. I end up with different recommendations for each house, since every house is unique. However, some of the most common recommendations in this investigation were as follows:

### Lower Cost

- Clean up small visible mold areas.
- Discourage smoking in the house (remember that any mold investigation should really be an IAQ investigation).
- Repair plumbing leaks.
- Remove carpets from basement floors.
- Vent the bathroom fan outside, not into the attic. Make sure the fan works.
- Conduct a thorough spring cleaning. Discard unnecessary materials, particularly



(left) The cracking drywall implies a moisture problem. (right) Removing some baseboard reveals the first signs of mold.



Pulling back carpet reveals the heart of the mold problem.

those stored on the basement floor.

- Install a CO detector.
- Clean the heat recovery ventilator (HRV) fresh-air intake.

### Medium Cost

- Repair the roof and flashings.
- Install a better bathroom exhaust fan.
- Vent the dryer outside.
- Repair the siding.
- Install gutters, downspouts, and downspout extensions.
- Repair or replace exterior HRV hoods.
- Make slight improvements to the grading adjacent to the house.
- Vent the kitchen range hood directly outside.

- Service the HRV.

- Use a portable dehumidifier in the basement during the summer.

### Higher Cost

- Strip out all of the basement finish and perform a large-area mold remediation.
- Strip out and renovate the bathroom.
- Install a heat recovery ventilation system.
- Make more significant improvements to the grading around the house.
- As the carpets reach the end of their useful life span, replace them with hard-surface flooring.



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Located in a heavily trafficked area, this wooden sump pit has provided an optimal environment for mold growth.

For five of the 21 investigated homes and one of the two trailers, replacement was probably more cost-effective than repair. If the sample was representative of the community, that would translate into about 22 homes needing to be replaced and 72 repaired, almost exactly opposite what was recommended by others. From the evidence gathered in these investigations, we found that many of the units had such small mold problems that it would have been socially and fiscally more responsible to quickly clean up the mold and renovate the units than to conduct large-scale evacuations.

Most of the mold contamination seemed to be the result of inadequate maintenance, inadequate ventilation and air circulation, plumbing leaks, and poor original construction techniques. Excessive storage in basements or in closets against exterior walls was also contributing to mold growth by limiting air circulation, allowing condensation and mold to occur on cool, damp surfaces. Doing the easiest fixes first would have enabled people to remain in many of the homes, instead of being evacuated.

Earlier reports had suggested that inadequate community drainage was a major cause of the mold in these houses. Although the community drainage was far from ideal, there was little evidence that flooding had caused most of the cases of mold contamination. Most of

these houses would probably have had the same amount of mold if they had been built on the top of a well-drained gravel hill. A community drainage project might have been desirable, but we considered it a much lower priority in preventing mold contamination than maintenance, ventilation, plumbing repairs, and building envelope repairs.

If resources had been concentrated on the most serious problems, those houses could have been remediated and reoccupied faster. Other needed maintenance and repairs could then have been done after the houses were reoccupied. In that way, less money would have been spent on temporary shelter, and more money could have been spent on the houses that really needed it.

Anecdotal reports during the course of these investigations revealed that misinformation about the causes and effects of mold in houses was widespread throughout the community. Occupants need information on preventing mold contamination so that houses don't become contaminated—or recontaminated.

It is important to remember that mold is not the only indoor air contaminant, and that IAQ investigations should be comprehensive. In several houses smoke detectors were either taped or covered to prevent their alarms from sounding. Evidence of cigarette

smoking, such as cigarette odor and full ashtrays, was seen in many houses. The health effects of environmental tobacco smoke are well documented.

A review of the mold sampling, the site investigations, and the subsequent reports created by other parties revealed that many housing managers and consultants might also benefit from additional IAQ training. Housing managers need enough training to be able to cope with situations beyond the expertise of the home occupants. When they hire consultants, they have to be able to ask the right questions and determine the reasonableness of the recommendations that they purchase.

Consultants need to focus more on conducting a thorough investigation, rather than simply focusing on mold sampling results. There is a tendency for many consultants to identify problems and solutions and then to act as project managers for the remediation. The more extensive the remediation project, the higher the management fee. The line between due diligence and overstating the risk can become blurred very quickly, creating an opportunity for price gouging.

A thorough, methodical, building science-based investigation by a skilled observer is the most likely way to arrive at a practical long-term solution to mold or other IAQ problems. After homes are reoccupied, occupants, as well as housing managers, must buy into the ongoing maintenance necessary to prevent mold problems from recurring. Training at appropriate levels for IAQ investigators, housing managers, and home occupants is key.



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