

Nauset Environmental Services, Inc.

an Air Quality Company

15 January 2014NES

Job

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3-15862

Report No. NES/IAQ-14/1597

Domenic & Maria Brown
32 Riverside Drive
Taunton, MA 22633

Re: Mold/moisture inspection for knee wall attic
for 32 Riverside Drive (Taunton)

Dear Mr. & Mrs. Brown:

Nauset Environmental Services, Inc. (NES) is pleased to submit this letter report from an inspection of mold/moisture issues in the knee wall attics at 32 Riverside Drive (Taunton). Following initial verbal authorization, NES sent William M. Vaughan, PhD, QEP, CIEC to the property on 14 January 2014 to inspect the home for moldy conditions with a focus on the attic knee walls. This report is **CONFIDENTIAL** and proprietary and its distribution is controlled by the Client to whom it addressed who may authorize wider distribution.

BACKGROUND: After a home inspection, moldy conditions were suspected in front the knee wall storage areas. NES was retained to carry out a mold/moisture inspection with focus on the attic conditions.

EXECUTIVE SUMMARY The results from this inspection found readily obvious signs of staining from condensation mold growth (CMG) in the front knee wall storage areas. When wiped with a finger the discoloration DID NOT come off the surface. Hence there is little risk of spore release into the breathing space and becoming a possible health risk.

General suggestions are provided to address moisture and mold issues in the house.

ON SITE ACTIVITIES – After Dr. Vaughan arrived at the house on 14 January just before 3:00 PM, he was escorted to the areas of concern by two real estate agents. The owner, Domenic Brown, was also present during the inspection. Photographs were taken at this time (see Attachment A).

OBSERVATIONS: Observations at 32 Riverside Drive during this inspection are provided below. [NOTE: Directions right-left and front-back refer to viewing the house from the street.]

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General

- There was NO strong moldy odor noted upon entering the house or the knee wall areas. [Moldy odors come from “microbial volatile organic compounds (MVOCs)” that are released from *currently active* colonies digesting the organic matter on which they are growing.]
- The weather was cloudy, cool (mid 40s) and humid with light rain at the time of this inspection.

Attic knee walls

- ◆ There were NO gaskets at the edges of the entry doors that would limit warm, moist air from entering the knee wall areas from the adjacent living space.
- ◆ There was gray to dark gray discoloration along the edges of the fiberglass insulation (see photo) installed against the sheathing. This discoloration is due to the filtering of the air that moves back and forth through the gaps between the insulation and the rafters. The filtered dust and particles are limited to the edges and are NOT mold growth.
- ◆ The insulation against the sheathing had been installed with kraft paper (see photos) proving an isolated space that did not breathe readily and allowed the sheathing to remain cooler and develop more condensation. (Had there been no backing, the space between the rafters could have had more air exchange and a chance to dry out.)
- ◆ Several the rafter bays on both sides of the front of the attic had gray to black staining of the plywood sheathing (see photos). On the right side knee wall (as viewed from the street) there was one a straight line of staining, marking the edge of a sheet of plywood (see photo), indicating a different history for that sheet compared to the adjacent sheets, NOT indicating a condition that was pervasive to the house (see discussion below). Rubbing these black, stained areas did not change the appearance of the area indicating that the condensation mold growth that led to the staining was *in the grain of the plywood* and thus not readily releasing spores. The staining was more irregular on other sections of sheathing on both sides of the attic knee walls and also not rubbed off (see photos).

These conditions indicate that warm, moist air had entered the attic in the past from the adjacent living spaces and condensed on the cooler sheathing to provide moisture for growth of pre-existing mold spores.

The observations of dark, in-grain discoloration in the attic are very common in New England when there has been limited attic ventilation in the past. Under those conditions warm, moist air entering the attic space in the winter from the adjacent living space condenses on the underside of the cold sheathing, usually on the north side or a shaded side. (The front of this house faces northwest.) The formation of this damp layer on the underside of the plywood activates growth of the mold spores that have settled there over the years or, more likely, accumulated from storage conditions between the plywood mill, lumber yard and job site, also referred to as “lumberyard mold.”

The generally more north-facing side of an attic roof often has these areas of darker staining from mold growth. Being colder for longer periods of time each day since

the sun does not hit the north side directly, there is more condensation on those surfaces. The resulting condensation mold growth involves micro fungi that are mostly in the grain of the plywood where the limited layer of water provides enough moisture to support digestion of glues, binders, etc. Hence these in-grain growth areas are much less likely to be releasing spores to the air than would come from surface growth. It is the inhalation of mold spores in the air that leads to exposure to allergens and irritating structural elements from mold colonies. The density of the resulting staining increases over the years of cyclic wetting/growth periods (winters) between dry/dormant periods (summers).

[Since the observation is of dark gray to black mold growth, many people assume that it must be “THE toxic black mold” widely mentioned in the media in recent years. That mold is *Stachybotrys chartarum* and has been associated with alarming anecdotes about impact on human neural function. Whatever the scientific findings on health impacts eventually turn out to be, the dark growth in attics is almost certainly NOT “THE toxic black mold,” for several reasons:

- *Stachybotrys* has a high requirement for water, not just periodic damp cycles, before it will establish a colony where its spores would accumulate in a slimy mass. Attics have no such high amounts of liquid water to promote their colonies.
- *Stachybotrys* prefers paper, not wood, as a diet, ideally from drywall that has been soaked for an extended time.

Hence, despite the color of the mold growth, it is NOT cause for alarm. As a matter of fact mold colonies develop different colors depending on their genetics and diet. Many common molds indeed develop dark colonies.]

The cat’s eye pattern of clear grain often observed around nail penetrations is an indication of inhibited mold growth as the zinc has dissolved off the nails as water condenses on the nails and then wicks sideways in the grain. This observation is another indication of the thin layer of mold growth in the grain has not penetrated into the sheathing beyond that very thin layer of damp surface impacted by the condensation. If a newer roof has been placed over darkened sheathing, there will sometimes be splinters that show clear wood just behind the surface darkening, again demonstrating the shallow depth of this mold growth.

This growth by micro fungi also does not deteriorate the strength of the sheathing. It takes much more moisture oozing through porous shingles and tar paper to support those wood-eating macro fungi. In that case there would probably be stained streaks running down many rafters as well as discoloration of sheathing immediately adjacent rafters.

(For a broader discussion of mold in attics see Chapter 8 in Jeff and Connie May’s

book The Mold Survival Guide for Your Home and Your Health that is Attachment B to this report.)

- ◆ There were NO water stains on the rafters that would indicate roof failure.
- ◆ When tested with a screwdriver, there were no soft areas where the screwdriver could penetrate the sheathing, indicating there was NO structural compromise

Garage

- ◆ There was staining and discoloration on the garage ceiling. Inspection of the attic space above did not reveal any indication of staining of the sheathing or leaking that might have led to the staining in the garage (see photos). [Note that the front roof sheathing in the garage is free of the lumber yard growth (see photo) found in the knee wall areas on the same northwest facing side. This observation is related to the absence of occupied spaces adjacent to the garage attic that would leak warm, moist air into that attic.]

DISCUSSION & SUMMARY:

The knee wall conditions observed are the result of warm, moist air that has been entering the attic from the adjacent living space and condensing on colder sheathing surfaces stimulating in-grain mold growth that has stained the plywood. The staining is not affected by rubbing, indicating that any spores associated with the mold growth are not being released into the air to cause potential health issues. The staining is cosmetic.

There was no readily apparent condition found in the attic above the garage to explain the staining on the ceiling of the garage.

There is no need for remediation of these stained areas since they are not releasing spores into the space, THE source of health concerns.

SUGGESTIONS:

To improve conditions in these attic knee wall spaces:

- Remove the existing backed insulation against the sheathing. If there is a desire to provide better insulation of these spaces, install un-backed fiberglass bats in the rafter bays.
- Install foam gaskets [e.g. Frost King foam tape) around the door frames to reduce the entry of warm, moist air into these spaces.
 - To reduce heat loss through the doors, install rigid foam insulation on the back side of the doors.
- Improve ventilation of these areas by adding small vents at the ends of these spaces.

To avoid problems with mold in the future, be attentive to any and all water intrusion or condensation issues, taking general advice from The Mold Survival Guide for Your Home and for Your Health by Jeff and Connie May (2004). In particular:

- Respond quickly to correct any leaks that may develop or become evident.
- Operate an Energy Star-rated dehumidifier on the floor of the basement throughout the year with adequate separation from solid objects and in conjunction with a small bilge pump in the collection bucket or a condensate pump outside the unit that discharges the collected water to a suitable drain. The goal is to lower the humidity below 60%, so a modest dry setting is usually sufficient. Periodically clean the unit's filter following the manufacturer's instructions.

- Turn off the water to the washing machine ANY TIME you leave for several days since rubber hose failure can occur in any season and cause massive water damage! **Better still**, treat the water valve as if it were a "switch" and turn off the water after each washing.
- If there are allergic or sensitized individuals living in the building, use a HEPA filter-equipped vacuum for routine cleaning to capture spores and irritants.

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The above discussion and recommendations are related to the information you provided and the conditions visually observable at the time of NES's site visit on 14 January and are thus limited to these activities and timeframe. Future events and changes in the condition and operation of the building may well alter the conditions for biological activity/growth, especially moisture. Such changes will alter the relative significance of these recommendations and the effectiveness of their implementation. Thus the impact of such changes and cannot be considered part of the scope of this report/work.

We trust the above information is sufficient for your current needs. Please call us with any questions or to clarify points.

Very truly yours,



William M. Vaughan, PhD, QEP, CIEC

President, Senior Scientist

QEP=Qualified Environmental Professional (since 1994)

CIEC=Council-certified Indoor Environment Consultant
(#0608032)



Attachment A

Photographs Taken During the Inspection



32 Riverside Drive



Isolated areas of condensation mold growth (lumberyard mold) in right knee wall area



Straight line lumberyard mold growth indicating a sheet of plywood with different history from neighbors



Lighter in-grain mold growth on left side [NOTE cat's eye pattern discussed in Attachment B.]



Gray material (dust/particle) at edge of insulation on left side



Right, rear of garage roof showing no signs of leaks that would have impacted garage ceiling



Front of garage room showing clear grain, nothing like the knee wall sheathing that was adjacent to occupied space where condensation on comparable surfaces supported in-grain mold growth

Attachment B

**Excerpts from
“The Mold Survival Guide for Your Home and Your Health”
by Jeff and Connie May**

The **MOLD**
SURVIVAL
GUIDE FOR YOUR
HOME
AND FOR YOUR **HEALTH**

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The Johns Hopkins University Press
Baltimore & London

treme cases you will see water dripping from the roof-shingle nails that penetrate the sheathing, which in turn will be completely blackened and even delaminated from moisture and mold. If you look down directly onto the floor beneath the nail tips, you may see stains where the drops fell.

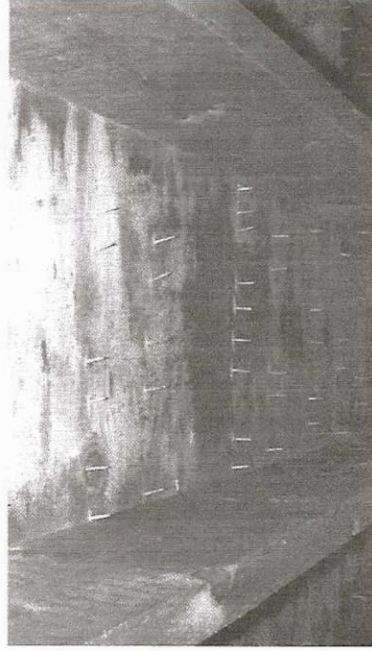
In a cold climate, inadequate ventilation of the attic space may lead to excess humidity as moist air from the warmer rooms below infiltrates into the cooler attic around plumbing pipes, the attic hatch, or even recessed lighting fixtures. The moisture in the air then condenses on surfaces that are below the dew point. Sometimes homeowners think their houses have attic ventilation, because roof vents have been installed, yet I have seen time and time again that while the external component of the vent was properly installed, the required opening in the wood roof sheathing or soffit trim was never cut. This can be true at the ridge vent (at the peak of the roof) and at

You relax in your living room chair, you sit at the kitchen table, you read in bed at night. Your home is your kingdom, and you think you are sovereign. Well, not quite. There are other realms in the house where Nature writes the rules, and in these unconditioned spaces, spores lie waiting to usurp your control of what may be the largest investment of your life.

Attics

Many people call me because they are worried about visible mold growth in their attics. The black growth on attic sheathing and rafters consists primarily of species of *Cladosporium*, *Alternaria*, or other genera of microfungi, but rarely, if ever, the potentially toxic *Stachybotrys* mold, because attics are not consistently wet (that is, the wood does not usually have water activity above 90 percent) and thus are not usually damp enough to sustain this kind of mold.

It is common to find black mold on the attic sheathing of a gable roof (one shaped like an inverted V), especially toward the lower edges above or near the overhang, or even along one of the gable end walls. Very often the north-facing roof slope is most severely affected, because it receives little sun during the day and doesn't warm up enough to accelerate evaporation and drying out. In ex-



Black mildew on attic sheathing. The nails (protruding through the sheathing between the two rafters) are what hold the roof shingles onto the sheathing. This north-facing slope of a gable roof is covered with black microfungi (not *Stachybotrys* mold). The black growth gets denser toward the overhang (at the bottom of the picture) where it is colder. The white ovals at the nail penetrations indicate a lack of mold growth; the zinc that leaches from the galvanized nails into the wood is toxic to mold.

Chapter 8

THE SPACES WE DON'T LIVE IN

soffit vents (at the overhang). If you hire roofers to install ventilation, make sure they cut the openings in the wood before they install ridge and soffit-strip vents. (Rectangular soffit vents are fine, but don't bother with small circular vents, which do not allow for adequate airflow.) Also make sure they install a roofvent that works.

Even with the best attic ventilation, you can still have a serious mold problem if too much moisture enters the attic from the house. For example, bathroom and dryer exhausts vented into the attic can lead to condensation, particularly in the winter. If mold is growing in your attic in just a few of the rafter bays above the bathroom or laundry area, you most likely need to vent the bathroom or dryer exhaust to the outside (and check for leaks in exhaust hoses). If there is mildew growing on most of the attic sheathing and the attic is well ventilated, you must find and eliminate the sources of moisture. Attic ventilation is important, but controlling the leakage of house moisture into the attic is *more* important.

If you live in a warm climate and air-condition your home, and the AC system and/or ducts are located in the attic, moisture from humid *outdoor* air, used to ventilate the attic, may also condense on the outside of the system's components, such as the condensate trap or lines, or the "suction line" to the AC coil, if they are below the dew point of the attic air. (Very often these are frustrating problems, because condensation is intermittent and occurs only on very humid days.) Uninsulated AC ducts (or those that leak cold air) are particularly problematic. In climates where air conditioning is used during much of the year, the roof sheathing is too hot for condensation to take place during the day. At night, however, if the sky is clear and the temperature outside is low enough, the roof (particularly the north-facing slope) may cool to below the dew point.

As discussed earlier in the book, an unbalanced heating or cooling system can also create attic condensation. I investigated one home in New York State in which the interior side of the gable-end sheathing behind the attic wall insulation and the exterior edges of the attic roof sheathing were black from microfungi growth. It was winter, and outside there were icicles hanging from the vinyl siding

at many levels on all four sides of the building. For some reason the homeowner had removed the duct for the hot-air system's only return, located in the hallway on the first floor. He had left the duct opening at the furnace, however, so all the air entering the system was coming from the very damp basement.

Since no air was being returned from the habitable rooms, the air pressure was higher in these locations than in either the attic or the wall cavities. This resulted in exfiltration to the attic and wall cavities from the habitable rooms, and moisture condensed in the attic, as well as on the sheathing behind the vinyl siding, where it froze in the winter. There was so much moisture in the walls that eventually they would have been decayed by macrofungi. Luckily this was the first winter this condition had existed. The remedy was to reinstall the return duct (and, of course, to clean up the mold and dehumidify the basement).

Check your attic periodically for mold growth. Treating attic mold with bleach isn't really effective, because the wood surfaces are porous and rough, and it's impossible to kill all of the growth. Where the mold is superficial (microfungi), there is no structural damage to the sheathing and rafters, and the growth is in the low part of one or two rafter bays, you should HEPA-vacuum the surfaces and then paint the affected wood with an alcohol-based primer, which will generally kill most of the spores and seal them into a paint film. (Consider hiring a professional to do this, because alcohol-based primers have flammable and toxic fumes, and great caution must be exercised during application. Follow all manufacturer's precautions.) Keep in mind that just painting over mold does not cure the underlying moisture problem, which *must* still be solved.

In many cases I find that one entire side of the attic is black with mold growth, but the sheathing is intact and the rafters are not damaged. In such cases a professional remediation can, under containment conditions (see part 3), clean the surfaces by soda-blasting or Dry Ice-blasting them (using baking soda or Dry Ice instead of sand, which is too abrasive). Then the wood can be sealed.

Attic sheathing in newer homes can be made of plywood or OSB

(oriented strand board, discussed in chapter 1). If, because of moisture and mold growth, plywood sheathing is delaminated and weakened, or OSB sheathing is swollen or damaged, the affected sheathing must be replaced. Of course, this means removing and replacing roof shingles. Any rafters that are significantly decayed from macro-fungal growth (most often due to leaks) may have to be repaired or replaced as well. Occasionally the entire roof structure has to be removed and rebuilt, though in some cases I think this work has been done because people overestimated the significance of the damage or because rebuilding was less expensive than professional remediation.

Remember that attic mold growth is most often due to genera of microfungi (*Cladosporium*, *Stemphylium*, and *Ulocladium*, all black, or *Penicillium*, which may appear to be white). These fungi usually only affect wood surfaces, whereas macrofungi destroy wood's structural integrity. If you have mold in your attic, consult an ASHI (American Society of Home Inspectors) member, an experienced roofer, or a structural engineer for a second opinion before hiring a remediator or tearing the house apart.

More often than not, mold on attic sheathing is not much of a spore exposure issue in habitable spaces below. Mold of any type in an unfinished attic may still, however, be a problem for those who are sensitized, if the mold emits an odor or is disturbed (sometimes people using unfinished attics as storage space disturb the growth, or AC return ducts suck in moldy attic air through leaks and gaps). And in finished attic spaces, microfungi can grow on carpeting or on walls that have been dampened by roof leaks or flashing leaks around chimney or plumbing vent pipes; mold in such spaces can be just as problematic as mold in any other habitable room.

An Attic Odor

One couple moved into a newly constructed home after they'd had a serious mold problem in the house they were renting, and they began to notice that they could occasionally smell the attic air in the upstairs rooms. They found out that the air ducts between the sec-

ond floor and the attic had many unintended openings. In fact, in some spots where lighting fixtures, supply grilles, or bathroom vents were located, they could see through from the attic into the rooms below. Their daughter was mold sensitized, and they were worried that any mold spores in the attic might be carried in airflows to the rooms below.

Since the house was new, the attic was probably not very moldy. Still, allergens do collect with dust in attics, whether ventilated or not. For this reason it's a good idea to minimize the amount of attic air that enters the habitable areas below.

In another home that had a mouse infestation in the exposed insulation in the attic floor, the new owner could sometimes smell a peculiar odor in the unfinished attic. I encouraged him to hire professionals to eliminate (under containment) the old exposed attic insulation, some of which was no doubt contaminated with mold as well as rodent litter, and then to thoroughly clean out the attic, HEPA-vacuum the floor structure (in this case, the floor joists and the back of the ceiling below), have the entire floor structure spray-painted (to seal it), and reinsulate, being careful not to leave any soffit openings to the exterior through which rodents or bats could enter.

The Roof

I was asked by a management company to investigate whether there might be a connection between the owner's respiratory problems and leaks associated with the fireplace chimney (a wood-framed enclosure for a metal flue pipe). The leakage had been going on for over a year, and there were stains near the chimney on the ceiling of the second-floor bedroom (including the closet) and around the fireplace in the living room on the level below.

Apparently the wood-framed "faux" chimney had been leaking water from the cap flashing (which covered the "chimney" at the top). The metal should have been convex, but instead it was concave, so rainwater collected around the pipe at the center, rather than running off to the edges of the flashing. Over the years the pud-

die of water rusted the metal, and moisture leaked down around the flue pipe. There was mold on the closet drywall and in the closet carpet where mold-eating mites foraged. The flashing as well as the moldy carpeting and drywall had to be replaced.

One family moved into a new home and found a serious leak above one of the finished rooms on the top floor, directly under the roof. Part of a wall, some carpeting, and a section of the floor had been damaged. They fixed the roof and dried the carpet, but they were still worried about the possibility of a hidden mold problem, so they e-mailed me for advice.

I thought there was a good chance of microbial growth in the carpet, and possibly the pad and even the subfloor beneath, if these had been wet several times and had remained wet for a few days. Wearing a NIOSH N95 mask and operating a room fan on exhaust, someone in the family or someone they hired (if people in the family had mold sensitivities) could carefully peel back the carpet and pad to see if they had been saturated, or if there was any staining to indicate the extent of the leak and any subsequent mold or bacterial growth. I warned them to be careful not to stir up any dust. If there was significant staining or visible mold growth, I recommended that they hire an investigator to evaluate the situation, and probably have professionals eliminate and replace any moldy carpeting and pad, as well as any plywood subfloor that had significant decay or delamination. (Always use containment when very moldy materials are disturbed in a habitable space; see part 3.) If the plywood seemed intact and was just stained, and there was no odor, then it could be sealed with alcohol-based primer before being recarpeted. Finally, if the family was considering keeping the carpet, I suggested that they HEPA-vacuum up a sample of carpet dust and send it to a lab for microbial analysis before making any final decisions.

Some home inspectors walk on the roof to observe the conditions of the shingles and the chimney. I recall one inspector telling me that the last time he did this (the very last), he was moving along cautiously when suddenly the shingles and sheathing gave way with a loud crunch. He ended up with the lower half of his body dangling

into the attic between the rafters. When those roof shingles were first installed, roofers were perfectly safe walking across the surface of the plywood sheathing and installing shingles with nails driven into the wood. What had weakened the roof since the installation? Most likely there had been a long-term roof leak, allowing severe macro-fungal decay.

I saw such decay during one of my home inspections, but fortunately I was in the attic when I encountered it, rather than on the roof, which happened to be flat. The attic was large because the house was huge, over eleven thousand square feet. I became suspicious when I noticed plastic sheets spread out on the attic floor and a mop with a bucket in one corner. At one location the tarpaper vapor barrier at the bottom of the fiberglass insulation batts between the roof joists was stained. I pulled down a section of the insulation, and water poured out; the roof sheathing was so rotted that the mycelia of macrofungi were in the wood. In this case the moisture originated from a leak around a poorly installed rooftop air-conditioning unit; the tarpaper prevented the moisture from evaporating. It's lucky that no AC technician ever took a step on that section of the roof while servicing the unit, because the person might have ended up in the attic.

One man e-mailed me because his roof had leaked in several spots for years before he repaired the problem. He had hoped any mold present would eventually die, since the moisture source had been eliminated. He lived near the ocean, and when the wind blew from the water, he sometimes found it hard to breathe in the rooms on the upper level of his house. Could mold growth caused by the roof leak be the culprit?

Given that the roof had leaked for a year or more before being repaired, I was pretty sure mold had grown in the unfinished attic, and even if the mold was dead, it could still remain allergenic. If the attic was ventilated, the force of the wind could stir up any moldy attic dust, which could then find its way through pipe openings and other gaps into the habitable spaces of the man's house. It's also possible that there were other sources of mold. Wind-blown rain can cause



Rotted sheathing in a flat roof. The dark plywood sheathing between the lighter-colored rafters has been damaged by wood-decaying fungi. Water poured out of the fiberglass as the insulation was lowered, and the white semicircular threadlike pattern above the knot in the rafter is probably the mycelia of macrofungi that were starting to destroy the wood structure because of the saturated conditions.

mold growth underneath the siding, for example, and even in the wall cavities of homes located near the ocean. (If the air pressure is greater in the wall cavities than in the house, mold spores can be carried indoors by infiltrating air.) I suggested that the man have an ASHI home inspector determine the extent of the problem and make recommendations for repairs.

If a roof has to be replaced, minimize the chances for exposing the sheathing to the weather. (In older houses, where planks rather than plywood or OSB were used for sheathing, rain will enter the attic through the gaps between the exposed planks.) Be aware of weather reports and know what steps need to be taken to protect the site during reroofing. If the weather is threatening, be sure the contractor comes prepared with tarps to cover the exposed roof areas. (Many roofers don't strip the entire roof at one time, so there is only

a small area to protect.) If insulation is soaked by a sudden storm, it should be removed and new insulation should be installed after any damp construction materials have dried out.

When roof shingles are replaced, the pounding on the sheathing can release wood debris into the attic. Stored goods and insulation will then become covered with dust. If there is mold on the sheathing in the attic and you are concerned about mold exposure, cover stored goods with plastic sheets before the roofers start (but don't lay the plastic over recessed light fixtures in the attic floor, because this could start a fire). Isolate the attic as much as possible from the rest of the house. If there is no attic floor, be careful where you step, lest you end up in the room below. Whoever cleans up afterward should wear a NIOSH N95 mask and should HEPA-vacuum the dust on the floor or on other solid surfaces. (If new roofing has already been installed on moldy sheathing, then exposed, soiled fibrous attic insulation may have to be replaced.)

Garages

If you are not overcome by the odor of gasoline in a garage, you may be sickened by the stench of garbage from the trash barrels or the musty smell of the mold growing in a damp corner. People tend to be careless about conditions in their garages, because they think of them as outdoor spaces. Roof leaks are ignored, and moldy leaves are allowed to blow in and accumulate.

I recently visited some friends I hadn't seen in many years. As I pulled into the driveway of their immaculately maintained ten-year-old home, I noticed a streak of green moss and a long, damp-looking vertical stain on the brick veneer at the interior corner, where the two-story house met the single-story garage that projected out from the front of the house. It appeared that the garage roof had a leak.

I unloaded my suitcase from the car trunk and walked through the garage, where I could see patches of black mold on the inside drywall, mirroring the outside water stain. After I took my suitcase to the second-floor guest room, I looked out the window and discovered that my room was just above the garage roof area where I sus-