



MOLD PREVENTION AND DETECTION:

A GUIDE FOR HOUSING AUTHORITIES IN INDIAN COUNTRY

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Introduction

News has been spreading about mold problems in Indian Country housing, as it has throughout many parts of North America. There are many questions being raised about how these situations should be handled, how people's health can be protected, and how costly emergencies can be avoided. Mold that is not attended to can damage homes, and combined with dampness, can lead to sagging walls, ceilings, or floors. It can be unsightly, and can sometimes cause discomfort and health problems. Having mold in one's home does not mean that health problems will necessarily follow; however, persistent dampness should be attended to.

This Guide has been prepared with the latest information on mold and moisture, and with survey information gathered from tribal housing agencies and occupants. It deals with these types of questions:

- *How should I respond to mold and dampness?*
- *What can a homeowner or renter do?*
- *What types of construction failures can lead to mold damage?*
- *Who should I work with?*
- *Where can I go for more information?*

This Guide presents information that will substantially increase housing providers' and residents' understanding of mold and moisture conditions in homes. It offers helpful advice on how to establish procedures for addressing moldy conditions and build viable partnerships that can help resolve problems. The procedures involved in mold prevention, detection, and resolution are not always obvious. In some situations, it may be necessary to enlist the expertise of specialized professionals.

This Guide includes information for the various partners who may be involved in mold prevention and detection, including:

- Housing agencies (directors, resident services, and maintenance staff);
- Home residents;
- Housing inspectors;
- Tribal council members;

Introduction *(continued)*

- Health providers;
- Building specialists, contractors, renovators, and architects.

The Guide also includes some information that's specific to the locations observed; i.e., those in northern Wisconsin and Maine. In addition, several tribes throughout the Eastern Woodlands region were surveyed to identify the types and conditions of homes that have been affected by moisture and mold.

One important lesson is that, while many of the relevant principles are universal, housing practices must be specific to the local climate, soil conditions, house type, and code. In new construction, things seem to work best when the builders and their crews are accustomed to the local area, the economy, the people, and the climate; when they receive feedback on what works and what doesn't; and when builders apply what they've learned about mold prevention when building new homes. For homes that are already experiencing problems, skill in determining the source of moisture is the key to addressing and resolving moldy conditions.

Case Studies

In preparing this Guide, six tribal communities (three in Maine and three in Wisconsin) were visited to determine the extent of mold and moisture conditions. Selected homes were investigated for moldy conditions and the occupants were interviewed on some basic lifestyle choices. A wide range of housing conditions were observed, including age of the units, occupancy type, structural soundness, environmental factors (such as flooding or ground-water problems), and reported levels of health and safety discomfort. Some units were quite new, built just in the past few years, while others dated from the 1950s.

In tribal communities, kerosene, propane, coal, and wood stoves are commonly used for cooking and heating. Increased indoor humidity is a by-product of this type of combustion. Furthermore, the tradition of multi-generational households may result in overcrowded homes. In newer, 'tightly built' houses, residents need to regularly use exhaust fans to counteract the moisture that results from daily living activities. Older homes may lack exhaust fans, and may therefore exhibit problems associated with moisture build-up. High humidity and crowded conditions, combined with inadequate ventilation, can lead to the development of mold.

Several tribal communities have reported the following repair strategies and preventive maintenance procedures to reduce the amount of moisture and mold in homes:

- Plumbing repairs;
- Replacing carpet with hard surface flooring (vinyl composition tile);
- Adding rigid insulation to the house exterior;
- Removing the home from its crawl space and reinstalling it on a slab;
- Relocating families and renovating the vacant houses;
- Removing and replacing water-damaged drywall in basements to a height of 4' – 0";
- Replacing ceramic tile bathtub enclosures with surround resin bathtub/shower enclosures;
- Adding vapor barriers in crawlspaces;
- Replacing drywall in bathrooms with water-resistant greenboard;
- Adding sumps to basements and crawlspaces;
- Replacing rotted windows with more energy-efficient windows;
- Replacing wood plates in basement framing with pressure-treated lumber;
- Adding pressure-reducing valves and shutoff valves on water lines;
- Providing dehumidifiers in basement bedrooms during summer months;
- Adding tempering valves on bathroom toilet tanks to reduce the amount of condensation and prevent dripping on bathroom floors.

Case Studies *(continued)*

While not always the case, it was observed that mold was located in many of the same places within a specific group of houses which share the same floorplan and foundation type (crawl space, basement, or slab) and were built on sites with similar drainage, soil, and groundwater conditions. In these cases, the same level of repair can be scheduled for each house in the area, conserving the time and money spent on home inspections for other home maintenance projects.

The survey also found that housing authorities which have already 'gotten the message' about moisture control are hampered, not by a lack of understanding of necessary construction techniques, but by opportunities to apply that knowledge during the course of the work. This is true both in new construction and in repairs to existing homes. Funding for remediation is limited; therefore, greater focus should be placed on preventive maintenance. An important part of any preventive maintenance program is ongoing skills training. Discussions with housing authorities generally indicated a level of sophistication about moisture control strategies and an awareness of 'lessons learned' from working with the existing housing stock.

Overview - What is Mold?

Mold decomposes dead matter. Without it, there would be no decay of dead leaves on the forest floor, and the environment would soon be overwhelmed by dead plant material. For mold to grow, it needs organic matter – leaves, wood, paper, cloth, carpet, leather, wood, drywall – and moisture. Mold grows by digesting, and thereby destroying, what it grows on. As such, it can seriously damage books, rugs, walls, and even the structure of a house, making it dangerous to occupy.

Mold can be black, white, red, orange, yellow, blue, violet, or brown. Sometimes, soot or salt stains on masonry or concrete can be mistaken for mold. Dab a drop of bleach on the stain – if it loses color, it may be mold.

Mold is found indoors as well as outdoors. Mold spores can be found virtually anywhere inside the home. When the right conditions are present, spores will germinate and mold will grow. Spores are like microscopic seeds: lightweight, unseen, traveling through the air. Usually, the types of mold spores found in a house are similar to those occurring outdoors, as they have either been tracked in or blown in through open windows and doors.

Mold doesn't always present a health problem. In order for mold to affect people living in a house, they must either touch it or breathe it in. While some people appear to be quite sensitive to mold, others are not. Some experience wheezing, stuffy nose, eye or throat irritation. Allergic reactions (like hay fever) are the most common symptoms.

Those with specific sensitivities may include:

- People who already have allergies or asthma;
- Those with weakened immune systems (such as cancer patients and those returning from the hospital – they can be susceptible to infections);
- Infants and young children; and
- Older people (especially those with emphysema or other conditions that affect their breathing).

According to the Institute of Medicine's Committee on the Assessment of Asthma and Indoor Air, mold may lead to a worsening of asthma in susceptible people. We do not know, however, whether mold can cause asthma in otherwise healthy people. Many theories have been raised to explain why asthma rates have been increasing, including people spending more inactive time indoors, houses being built with less ventilation, increasing use of cool-wash cycles (cold water does not effectively remove allergens), and widespread use of carpeting, among other reasons. Most of these theories have not been adequately supported through well-controlled scientific studies.

Overview - What is Mold? *(continued)*

Mold is often a sign of dampness. Dampness also supports dust mites, which are known to cause and worsen childhood asthma. Dampness should be avoided, particularly in rooms where people spend a lot of time (for example, in basement bedrooms).

If you can see or smell mold in the house, steps should be taken to find the source of the excess moisture and clean up and remove the mold. Mold can appear as patches or speckled growth, and it may smell musty. Examples of obvious moldy conditions include discolored carpeting on uninsulated cold, damp basement floors or flood-damaged drywall. Common sense should prevail, with the focus not on mold but on returning the house to a dry condition. Mold can be seen as a warning sign that a water problem exists and needs to be fixed. If dampness or water damage is already a problem, repairs should be made so that mold doesn't keep coming back.

It is not necessary to identify the type of mold in order to fix the underlying moisture problem. However, for other purposes, such as for insurance claims for flooding (check with AMERIND Risk Management Corp.; see Partnerships), or for evidence in Imminent Threat cases, or to document the effectiveness of cleaning, samples are often collected. If you decide in favor of sampling, consider having it done by qualified staff in tribal Environmental or Health Departments, Indian Health Service, or by an outside consultant, such as an industrial hygienist (see *How to Get Special Help/Finding Equipment*). Often, the local Health Department can make recommendations.

More valuable than sampling is the survey for evidence of water damage and the extent of mold that can be seen. Those who are familiar with construction and home maintenance may be best qualified to do this type of work. Typically, the survey includes an inspection for sources of moisture coming into the home; for example, defects in construction (poorly installed windows, roof, or exterior siding; improperly laid foundations; absence of vapor barriers) or plumbing leaks. In many cases, mold grows inside walls or in other hard-to-reach locations. It is often necessary to pull up carpet, crawl under the house, and inspect ceiling spaces. Flashlights, mirrors, borescopes, and moisture meters are the tools of choice (see Equipment in *How to Get Special Help/Finding Equipment*).

It is important to know about past water damage, because hidden mold may be an ongoing problem. Review whether the home has had flooding, roof leaks, plumbing problems, or other damage. Be very careful not to disturb mold behind walls – without adequate precautions, pulling walls apart is not a good idea. Non-destructive methods are much better. For example, a borescope can be inserted into a small hole in the wall and used to survey internal conditions to see whether there has been water damage or mold growth.

Homeowner's/Renter's Mold Prevention Suggestions

Simple changes inside the home can sometimes improve conditions, and prevent mold from ever becoming a problem. Here are several suggestions.

In General . . .

Keep the house clean, dry and free of clutter.

Vacuum often. If you need a new vacuum, choose a HEPA vacuum cleaner (see *How to Get Special Help/Finding Equipment* for more information).

Check for mold – blotchy stains on ceilings, walls, floors, and window sills; musty odors; 'shadow marks' behind furniture.

Fix leaks right away.

Throw away any wet or badly damaged materials.

Ensure that nothing that smells or looks moldy (such as beds, sofas, or carpets) is brought into the house.

Keep windows open during dry, mild weather.

Reduce humidity by limiting the amount of showering, cooking, and other activities that bring water into the house; use a dehumidifier or an air conditioner, especially during muggy weather.

Insulate pipes to prevent condensation.

Use storm windows.

Outside

Check to see if water is coming into the house from leaks in the foundation, walls, roof, or from the sump pipe. Make repairs.

If there are gutters, install downspout extenders to carry rainwater and melted snow at least 3 ft. away from the house.

Keep downspout extenders from being damaged or disconnected.

If there are no gutters, place hard material where rainwater drips off the roof to carry water away from the house.

Homeowner's/Renter's Mold Prevention Suggestions *(continued)*

Ensure that the sump pipe is carrying water away from the house, not into it.

Prune trees and bushes to prevent excessive shading and encourage air circulation around the house.

Bushes planted 3 ft. or so away from the foundation are helpful. Bushes planted against the house are not as helpful.

Periodically remove leaves and dirt from gutters.

Front Door/Entry

Ask family and friends to leave their shoes by the front door.

Use mats at the front door to collect dirt, and vacuum them regularly.

Basement or Crawlspace

If there is carpet in basement bedrooms, remove it. Basement floors are often damp and cool.

If carpet is desired, use throw rugs that can be taken up and cleaned. Any carpet should be able to be pulled up for cleaning.

Keep mattresses off the floor – use a frame and boxspring or plywood and concrete block frame to allow air to circulate under the bed.

Store firewood on a porch, shed, or garage – not inside.

Clean the floor drain by pouring half a cup of bleach into the drain, letting it sit a few minutes, then flushing with water. Keep the drain trap filled with water.

Any house that may have a water problem in the basement or crawlspace should have a sump pump.

Keep the sump pit covered.

In summer or in wet weather, use a dehumidifier to remove the moisture from the basement. Empty it periodically and keep it clean.

Vent the clothes dryer to the outside.

Don't hang wet clothes indoors to dry.

Homeowner's/Renter's Mold Prevention Suggestions *(continued)*

Periodically clean or replace filters in furnaces, air conditioners, dehumidifiers, and other equipment.

Keep boxes on raised platforms and away from basement walls.

Don't store things in the crawlspace.

Visit the crawlspace regularly, using a strong flashlight. Look for signs of mold, plumbing leaks, and signs of termites, mice, or other pests.

Bathroom

Check to see that the bathroom fan exhausts to the outside, not to the attic.

Have everyone make a habit of using the bathroom fan when showering. Keep the fan running several minutes afterward.

Don't use carpet in bathrooms.

Check under the bathroom sink and around shower stalls and toilets; repair any plumbing leaks that are found. Discard anything that is damaged or moldy.

Kitchen

Check to see if the exhaust fan over the stove vents to the outside. If so, use it when cooking.

Check under the kitchen sink for plumbing leaks and repair any that are found. Discard materials that are damaged or moldy.

Empty kitchen garbage cans daily to prevent odors and spoiling.

Closets and Bedrooms

Keep only what you need – give away unneeded clothes, blankets, and other items that may get moldy.

Open doors (including doors to closets, which may be colder than other rooms) to increase circulation and warm cold spots.

Use area or throw rugs instead of permanently installed carpet in bedrooms.

Clean rugs frequently.

Homeowner's/Renter's Mold Prevention Suggestions

Family Room

Keep sofas and other furniture away from the outside walls to allow air to circulate.

Vent kerosene, propane, coal or wood stoves, and heaters to the outside. As much as seven gallons of water per day can be produced by an unvented heater (the health risks from carbon monoxide and other gases are even greater).

Finding the Cause of the Condition

To help you understand what mold in different locations may be telling you about water damage, and what to do about it, the following pages present a series of photographs. They show the moldy condition (or signs of water damage), what the possible cause of mold/ water damage in that location might be, and then what can be done to resolve the moisture problem and stop mold from growing. In some cases, it will be necessary to do more work to figure out the cause before developing a solution. In others, the best approach is to try different ways of fixing the problem until arriving at the best one for a particular condition.

Condition: Mold on Attic Access Panel

Possible causes :

The ceiling is insulated, but the attic access door is not. In the winter, the door is cold so the warm wet air from the bathroom wets the cold surface of the access door. Mold can grow on this wet plywood.



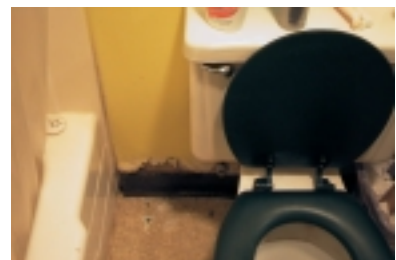
Things to try :

Insulate the access door.

Condition: Bathroom Wet Wall Deterioration

Possible causes :

Poor use of shower curtain,
or failure to clean up wet areas after shower.
Plumbing defect.



Things to try :

Make plumbing repairs.
Improve shower habits of occupants.
Install more water-resistant surface materials in threatened areas.

Finding the Cause of the Condition *(continued)*

Condition: Mold Between a Basement Slab and Carpeting

Possible causes :

Rugs, boxes, mattresses, and furniture that sits on basement slabs may be continually dampened by water beneath the slab.

Things to try :

On basement slabs, use only rugs that can be washed in the home washing machine.

Improve rainwater discharge away from the home.

Install a sump pump.



Condition: Discolored Ceiling Corner

Possible causes :

Poor detailing of insulation at the eaves, permitting air flow through insulation during cold weather.

Elevated or slightly elevated indoor humidity.

Things to try :

Use non-porous insulating materials, such as foam or cellulose in revised details.

Find excess moisture sources, such as a humidifier, wet foundation, or a backdrafting combustion appliance.

Install additional permanent ventilation in high density living areas.

Check for ice damming.

Check to determine if discoloration is due to mold or carbon particles from combustion.



Finding the Cause of the Condition *(continued)*

Condition: Dilapidated Conditions *(wall shown at the inside and outside)*

Possible cause:
Inadequate construction

Things to try:
Provide appropriate construction



Condition: Plumbing Leak, Away from Exterior Wall

Possible cause:
Plumbing defect.

Things to try:
Make plumbing repairs.



Condition: Flood Event

Possible causes:
Failure to keep rainwater away from the home foundation.
High or rising water table.

Things to try:
Anticipate possible flooding.
Improve landscaping and provide adequate sump pump protection.



Finding the Cause of the Condition *(continued)*

Condition: Wet Crawlspace

Possible causes :

- Poor rainwater discharge away from the house.
- High water table.
- Water entry from plumbing leak or A/C condensate.
- Evaporation of water from exposed wet soil.
- Rainwater entry through vent opening.

Things to try :

- Provide a ground cover.
- Improve the rainwater discharge away from the foundation.
- Install interior drainage and a sump pump.

Other thoughts :

Wet crawlspaces lead to many moisture problems in the living space and in framing cavities.



Condition: Mold Growth at Window

Possible causes :

- Elevated indoor humidity leading to condensation that runs onto frame and sill.
- Poor detailing of window or window installation leading to rainwater entry.
- Window unit of low insulating value.



Things to try :

- Reduce the wintertime humidity by finding the excess source, or, if due to living density, install adequate ventilation.
- Determine if all similar units display similar performance; if so, consider installing better units.
- Determine if problem is primarily at corners or ganged units; if so, consider re-installation with better flashing.

General Clean-Up Procedures

This is a brief outline of what can be done to fix moisture problems and clean up mold. The right approach will depend on specific conditions in the house. A good understanding of the extent of damage caused by water and mold may require careful inspection. The most important skills are those of a detective.

There are many useful guides available on this subject. A great deal of information is readily available at no cost through reliable sources on the Internet. Some of the best sources of information are listed in the References section at the back of this Guide. After reviewing the general steps outlined below, see the References section for further guidance.

Steps to Take:

1. Identify and stop the source(s) of water or moisture.
2. Inspect for dampness and mold growth. Check for any past flooding, leaks, or plumbing problems. Record your findings in writing and with photographs, noting locations on floorplans if possible.
3. Clean and dry moldy areas using special precautions.
4. Bag and dispose of all moldy items.

When you are done, everything that's going to be reused should be dry, and should appear to be free of mold. The area should be checked regularly to see if the work was effective. Mold is likely to return if the moisture/water problem has not been fixed.

What a Homeowner or Renter Can Handle

Small amounts of mold can be removed and simple repairs to fix moisture problems can be done by homeowners and renters. This type of job, like house cleaning and yard work, is usually considered part of running a home. If you are a tenant or homeowner, you can and should remove small areas of mold as soon as they become apparent.

If the moldy area is less than 10 square ft. in size, you can probably handle it. Protect the health of your family when you clean up mold. Ask them to leave the area. Protect your own health by buying and using an N-95 respirator (available from a local hardware store). Wear old clothing that can be cleaned or discarded, and use rubber gloves. Hard surfaces can be cleaned with water and detergent. Clean a small test area. Once the area is thoroughly cleaned and rinsed, consider using a solution of 10% household bleach (1-1/2 cups of bleach in a gallon of water). In order for the bleach solution to work, it should be left in place for 10 or more minutes. Bleach is irritating to the eyes, nose, and throat. Open windows and turn on fans. If you feel that this activity is affecting your health, you should consider contacting the Housing Authority for assistance. Work for short periods of time, resting outside or in a different area of the house. Air out the house during cleaning and afterwards.

Damaged ceiling tiles, drywall, and carpet generally need to be discarded by bagging the items and placing them with the household trash. It is preferable to bag it wet, because when moldy materials dry out, spores can be released. Unless it is dried within 24 hours and cleaned, carpet will often need to be discarded.

If mold grows back, you should notify the tribal Housing Authority and request an evaluation by the Environmental Health Specialist or Maintenance staff. You may not be alone in this situation.

Identifying the Need for Maintenance or Professional Help

In situations where mold covers an area greater than 10 square ft., maintenance staff or outside contractors should be called in. Generally, work orders will be needed to guide the job (see Appendix C for information on Work Orders).

Work Orders must be carried out in a way that does not endanger residents, and that actually fixes the undesirable conditions. During the course of repair work, hidden moisture and mold damage may become obvious. This may increase costs and require additional time. All work should be performed with proper planning and foresight. Mold can be removed from indoor environments, but it is often difficult to completely eradicate. Dead mold contains substances that can cause allergic reactions. The actual health benefits of mold clean-up have not been extensively studied.

In cases where there has been a history of flooding, or damage has continued over a long period of time, the structure (walls, floors, or roof) may have to be opened up and inspected. This must be done with care and planning to avoid making conditions worse (spreading mold). If flooding has occurred, the drywall will have to be removed to the high water mark and replaced.

Refer to the New York City Department of Health and the U.S. EPA publications in the References section for guidance on mold remediation that is beyond the capabilities of the homeowner/tenant.

The most important aspects of extensive mold clean-up involve good planning to assure that:

1. The work is handled properly;
2. The occupants of the house are protected; and
3. The problem is resolved.

It is often helpful to carefully review the situation at each step of the process.

Questions to Ask When Maintenance or Professional Help is Used

To check that your job is ready to be done and that it's being done properly, ask yourself these questions:

Before the Work Begins

- Have the possible risks to residents been identified?
- Have the residents been informed of possible risks and their responsibilities?
- Have the causes of problems been adequately identified?
- Should more time be spent assessing the problem?
- Are you satisfied that work is ready to begin?
- Is the work area set up?
- Is the work area closed off from residents?

During Work

- Is the cause of the problem being corrected?
- Is the work area safely set up?
- Are dust and debris being contained in the work area?
- Is mold kept from spreading beyond the work area?
- Are workers wearing necessary protective clothing and equipment (respirators, coveralls)?
- Are workers cleaning up each time they leave the work area?
- Are workers cleaning thoroughly and avoiding the use of unnecessarily harsh chemicals?

At the End of the Job

- Was cleaning done thoroughly?
- Were repairs properly performed?
- Did workers fix the cause of the problem?
- Did workers remove all visible mold and moisture damage?
- Is the area clean and dry?
- What evidence was collected to prove that clean-up worked?

For Long-Term Success

- Is there a plan to prevent leaks and dampness in the future?

New Construction and Home Maintenance Repairs

In this section, we look at strategies for preventing moisture and mold in new homes, as well as in homes that are already in use. When new homes are being planned, there are numerous opportunities to avoid moisture and mold problems. In existing homes, regular maintenance and careful inspections can also prevent problems from surfacing. Clean, dry houses almost never have mold problems. The homeowner/tenant's job is to keep the floors, walls, ceilings, and other surfaces in the home dry enough to prevent mold from starting, and the suggestions below will help you do that. There are many other rules of good practice, but these count the most.

Cleaning Surfaces

If a surface is dirty, it is hard to tell whether it is moldy or not. You need to keep the floor, walls, ceilings, trim, fixtures, appliances, cabinets, counters – all surfaces – clean enough to tell if they are moldy or not. If they look moldy, clean them off, then wait and see if mold forms on the clean surface. If it does, then you have a mold problem that you need to fix.

Roofs

Water from a roof leak might go almost anywhere in the house and cause mold to grow, so it is essential to repair all roof leaks. Here are some of the things you should do if you have a sloped roof that is covered with asphalt shingles:

- When you roof a house with shingles, follow all the directions on the shingle package.
- Flash the roof carefully where the roof meets any wall, around items that come through the roof (like chimneys and flues), and at all valleys. Use drip edges at the eaves. Build up flashings and diverters where water running down a roof hits a chimney or other blockage.
- Seal up all holes between the ceiling and the attic or rafters to keep the hot, damp air in the house from getting into the attic and causing serious trouble.

If you have another kind of roof, see *How to Get Special Help/Finding Equipment*.

Gutters and Downspouts

Water that runs off the roof must not soak in around the house; send it as far away from the perimeter as possible. One way is to install gutters and downspouts that catch all the water running off the roof.

New Construction and Home Maintenance Repairs *(continued)*

In addition...

- Don't let water run down behind the gutters.
- Add leaf guards over the gutters, or keep the gutters clean by using a broom or hose.
- It is o.k. to set gutters dead level, but it is better to slope them toward the downspouts. Never slope a gutter away from a downspout.
- If the house is on a slope, try to put the downspouts on the downhill side of the house.
- Make sure the gutters and downspouts are securely fastened to the house so that snow, ice, and wind don't loosen or knock them off.
- To send water from the downspout away from the house, add downspout 'extenders' and splash blocks to send the water coming out of the downspouts away from the house.
- Surround these extenders and splash blocks with plants or objects (but not grass) so that they don't get knocked off by mowers.
- The water from the downspouts should come out at least 3 feet away from a house that has a crawlspace and 5 feet away from a house with a basement.
- Be sure to keep downspouts clean, or water will run down the wall and soak the ground next to the house.

Roof Overhangs and Drips

If there are no gutters, then the roof should have an overhang. Here are some tips on using overhangs to control roof water:

- The larger the overhang the better, as long as it's built strongly enough to resist the wind.
- At the drip line under the edge of an overhang, install a trench of hard material to prevent erosion.
- Fill the trench with round stones to keep the water falling off the roof from 'back-splashing' and making the siding wet.
- Design the trench like a gutter, so that water courses away from the house.

New Construction and Home Maintenance Repairs *(continued)*

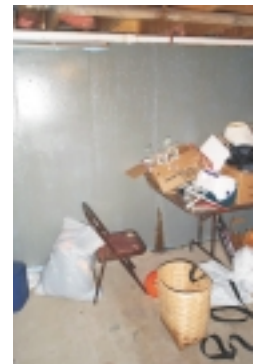
Grading Around the House

It is extremely important to keep soil that is in contact with the foundation of the house from becoming saturated with water. Anything that sends water away from the house is helpful. One important way to do this is to grade the ground around the house like a roof – a 'ground roof' – so that the ground acts like a sloped skirt, forcing water to course away from the house. Here are some rules for grading around the house:

- Ensure that water coming down a hill toward the house can run sideways around the house (keep it 10 feet from the house).
- If the house is right up against a slope, see *Special Help*.
- Be sure to fill in low spots or soft spots in the ground around the house so that water won't collect there.
- It is very important to slope paved areas (like porches, patios, walks, and driveways) away from the house.
- Seal up any cracks in the paving and between the paving and the house to keep water from collecting under the paving or porch.
- If the paving has to have cracks, like brick or stone paving without grout, make sure the area under the paving drains away from the house. You may need to dig down and put in a drain.
- Plant bushes and small trees at least three feet away from the house. Plants that are away from the house help soak up water and keep the house dry. If they are too close, they collect water and cause water problems in the house.



Depression in soil at the sewer pipe may lead to water entry.



Here, we see water entry into the basement due to...



...outside planter with unintended drainage down outside basement wall.

New Construction and Home Maintenance Repairs *(continued)*

Exterior Walls and Windows

Like the roof and the ground around the house, the exterior walls and windows need to shed water. Here are some helpful tips:

- Every drop of water that lands on the walls or windows of a house needs to run down, out, and away from the house.
- Siding or shingles that overlap horizontally are better at shedding water than sheets of plywood, wallboard, or stucco.
- Water can get behind any siding material. When it does, it needs to run into a continuous sheet of building paper or housewrap, which makes it run down the wall and keeps it from coming inside and getting the framing wet.
- Water running down a wall will sooner or later hit an obstacle like a sill or window frame. When it does, it should always run onto flashing that sends it out to the surface of the wall.
- If vapor control is a concern, it is better to use insulating sheathing than to install a polyethylene vapor barrier on the inside.



Installation of new siding.



Foundation crack that could lead to water damage in basement. This type of damage can hide behind walls in finished basements.

Below-Grade Drainage

Taking care of roof and surface water will solve most of your water problems. Sometimes, underground water is the culprit. If you are in a low-lying area with poor drainage, or in an area with clay soils, hidden layers of clay, or rock ledges, see *Special Help* to deal with underground water. Here are some hints for ordinary conditions:

- If you're sure that ground water will never reach the footings, you don't need to do anything special.

New Construction and Home Maintenance Repairs *(continued)*

In addition...

- Footing drains are used to protect basements and crawlspaces from rising ground water.
- For these drains to work, they must be laid at the bottom of the footings, not at the top.
- An additional drain can be installed inside the footings (a 'French drain') and connected to the outside drains or to a sump pump.
- Footing drains must drain to discharge to a community storm water system; to a low point on the site; or to a sump pump, community storm water treatment, or daylight.
- Water from downspouts should stay on the surface. Never connect them with the footing drains.

Basements

- Concrete basement walls are preferable to block basement walls, because they stand up better to side loads caused by water and are less likely to leak.
- Always damp-proof the part of a basement wall that can't be seen.
- Insulation works better on the outside of a basement wall than on the inside because it keeps the wall dryer.
- If you insulate on the outside, be sure termites cannot reach framing by tunneling through or behind the insulation.
- If you insulate on the inside, make it removable to inspect for and repair water damage behind the insulation.
- If basement walls become moldy, they can be cleaned with a mild bleach solution.



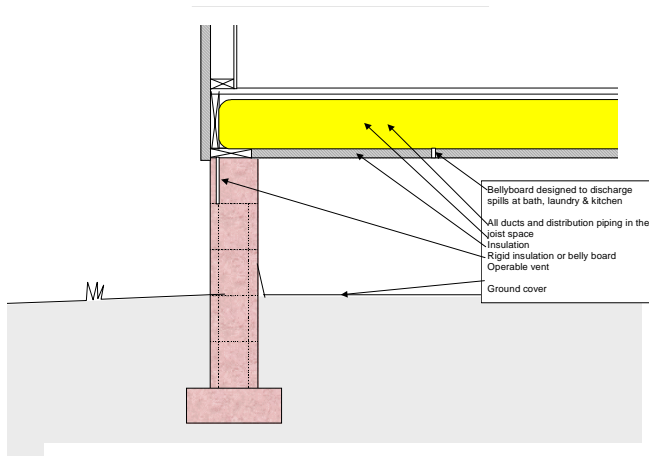
Basement before refinishing, with some water entry.



Basement rehab showing polyethylene behind drywall and framing.

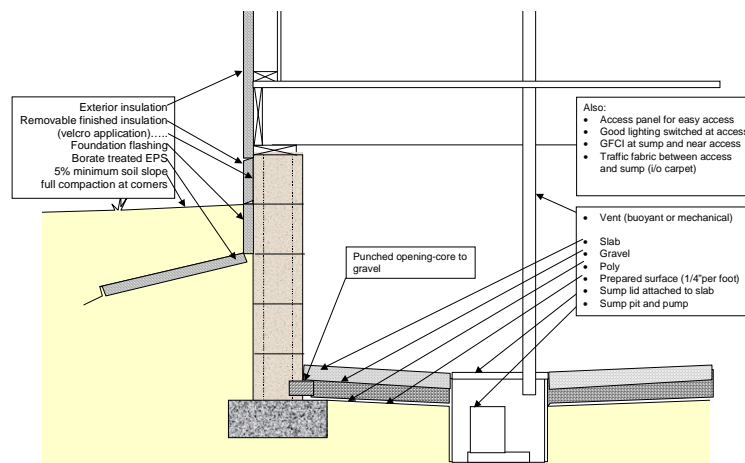
New Construction and Home Maintenance Repairs *(continued)*

Crawlspaces



This is a detail of a well-vented crawlspace, showing the 'bellyboard' membrane that seals the home from the crawlspace, with a small drain to discharge any leaks or overflows. Generous venting is required in the frost walls, with vents held well off the ground, and no equipment or piping should run in the crawlspace except services. Water service piping should be insulated and secured with electric heating tape. It is essential to cover the floor of the crawlspace with a ground cover, and to ensure that water drains away from the crawlspace.

This is a detail of an unvented crawlspace with sloped floor draining to a sump pit. It also shows an exterior insulation system that allows a shallower frost wall. As unvented crawlspaces are not yet allowed by most codes, you may need to add closeable vents to get a building permit. Note the radon vent exhausting from the sealed sump pit.



New Construction and Home Maintenance Repairs *(continued)*

Crawlspaces *(continued)*

Most moisture problems in single-family houses occur in homes with crawlspaces, because water problems may persist for long periods of time and go unnoticed. Here are some important tips about crawlspaces:

- Crawlspaces should have easy access and good lighting, so as to enable regular inspections.
- Water in a crawlspace typically comes from poor rainwater management outdoors, plumbing leaks, air conditioner condensate, or water softener discharge.
- If there is no mechanical equipment or ductwork in the crawlspace, insulate the floor framing, add a continuous vapor-tight material to the underside of the floor, and install large vents (larger than required by code) that provide cross ventilation.
- Otherwise, design the crawlspace like a stubby basement, without vents and with easy access.
- Cover the soil surface with a ground cover: a slab of concrete, a polyethylene sheet, or other vapor-proof material.
- Ordinary (built to code) vents can only deal with small amounts of moisture. The choice of ground cover and adequately controlling surface drainage are much more important.
- Vents should never be installed near grade. Otherwise, they might let water into the crawlspace.

Slabs

- Slabs are usually poured over a sand or gravel base; it is very important to keep water from downspouts from getting into this gravel or sand base.
- Radiant heating should not be used if there is water near the underside of the slab.
- Carpets on slabs are a common source of mold inside homes.
- Any carpet or other fabric on a slab should be removable for complete cleaning and disinfecting. If that is difficult, make the part near the outside walls removable.

New Construction and Home Maintenance Repairs *(continued)*

Sump Pumps

Any foundation with water problems of any type should be equipped with a sump pump in a sump pit. Whenever possible . . .

- Locate the sump pit near the wettest or lowest spot in a basement or crawlspace.
- Provide a way for water from other potential wet spots at the foundation to get to the sump pit.
- In a basement, you can use the gravel base under the slab to drain water to the sump. Make the ground under the gravel slope to the sump pit.
- In a crawlspace, try to install the sump pit near the access point, and have the soil surface drain to the sump pit.
- The pump should discharge to a site downhill and away from the home, so that the water cannot migrate back to the house.
- In areas subject to severe storms and power outages, a back-up generator is a very good idea.
- If necessary, a sump pit that can be covered may be used for radon evacuation.

Water Softener Recharge

Resin-exchange water softeners require occasional recharging, and this process produces large quantities of water with high salt content.

- Discharge water from a water softener should never be dumped into the crawlspace.
- Check with the provider of the water softener to determine the appropriate procedure for discharging the recharge water.

New Construction and Home Maintenance Repairs *(continued)*

Plumbing and Fixtures

Another source of water is leaking plumbing. The following rules of thumb apply:

- Plumbing systems should not leak, and if they do, they should be promptly repaired.
- Leaks in the water supply system may produce large quantities of water, but it will be clean.
- Leaks in the Drain Waste Vent (DWV) system may be small, but are often unpleasant and unhealthful.
- Water from leaks may lead to deterioration of surrounding materials.
- Any damaged or moldy material should be removed.
- The shelf under the kitchen sink is a common site of damaged materials.
- If the damaged or moldy material is extensive, professionals who are trained to confine work areas from the living space should be responsible for repairs.
- Regularly check crawlspaces for leaking plumbing.



Unintended water entry by sewer line.

Furnaces, Boilers, and Stoves

Furnaces, boilers, and stoves burn fuel to produce heat. In turn, the combustion process produces moisture. This moisture should be discharged out of the house through a chimney (or, in energy efficient condensing equipment, through the discharge piping).

- Unvented combustion equipment, including heaters sold as 'ventless' heaters, unvented kerosene stoves, and the kitchen range, should never be used for space heating.
- The risks of moisture damage are great, but the risks to health from carbon monoxide and other pollutants are even greater.
- Before every heating season, the chimney should be checked to ensure that it draws properly.

New Construction and Home Maintenance Repairs *(continued)*

Air Conditioning and Condensate

The work of an air conditioner takes place at the coil inside the furnace or air handler, and it won't do its job in humid weather if the A/C unit is too big. The process is as follows:

- Return air passes along the coil and its temperature drops.
- After about 15 minutes of service, water begins to drip from the coil into the condensate pan, down the condensate pipe or tube, and away from the equipment.
- To prevent mold and maintain comfort, air conditioning equipment needs to remove humidity from the air.
- Overly large air conditioners cannot remove humidity from the air because the coil will satisfy the thermostat too quickly, resulting in a 'short cycle.' Small or 'right sized' cooling equipment provides better humidity control because it runs longer in each cycle.
- The condensate pan should be cleaned at the start of each season, and the condensate piping should be checked to ensure that it is open.
- Condensate should discharge safely, not onto crawlspace or basement surfaces.

Humidifiers and Dehumidifiers

During the heating season, the indoors may become dry, and you may need humidification. Consider the following condition-specific strategies:

- If the dryness is uncomfortable (occupants are experiencing irritated nasal passages or contact lenses, for example) or if you are protecting antiques, equipment, or musical instruments, then consider a humidifier.
- Don't try to humidify a leaky house; first close up the leaks.
- Humidity will usually spread quickly throughout a dry house, so you don't usually need a unit permanently installed on a furnace. A free-standing unit is easier to control and maintain, and will work just as well.
- Humidifiers require care and maintenance, and most need to be cleaned regularly.
- If the windows begin to run with condensation during the winter, that's a sign that the humidifier is too active and could cause moisture damage to the house.

Dehumidifiers are very helpful and useful during the cooling season. They may be quite expensive to run, but they do a good job of reducing potential moisture damage and mold in a home.

New Construction and Home Maintenance Repairs *(continued)*

Fans and Vents

- Having and using a bathroom fan is generally good for moisture control.
- Many newer homes are built so tightly that, unless dry outdoor air is brought in, the moisture naturally produced by a family can cause high indoor humidity levels.
- In muggy weather, outdoor air cannot help make the indoor air drier. During muggy weather, the only way to reduce indoor humidity is to close up the house and use dehumidifiers or air conditioning.
- Fans should be selected for quiet and energy efficient operation.
- Fans should discharge air out of doors, not into attics or crawlspaces.
- Opening windows during mild weather is usually a good idea, but don't alternate between open windows and air conditioning. Once you start air conditioning, keep the windows closed until you don't need it any more.



In winter, heat recovery ventilators can be used to increase the amount of ventilation without losing heat.



Discoloration (mold?) at ceiling under soffit vent.



Site of water entry into fan above scoop that faces prevailing winds.

New Construction and Home Maintenance Repairs *(continued)*

Checking for Wetness

- Indoor air should smell fresh. Odors from cooking or smoking may mask odors from molds.
- Don't store anything in crawlspaces.
- Leave outside corners – especially those near downspouts – visible for inspection.
- Visit crawlspaces regularly. Look for signs of mold in the area of the band joist (the outside perimeter floor framing).
- Check for plumbing leaks. Look especially under kitchen sinks, under shower stalls, and around toilets.
- Peel carpet back from the floor along the outside walls of the home. If there is a persistent problem, devise a way to make the carpet or the carpet edge easily removable.
- At the first sign of moisture problems in the foundation area, correct the grading and downspout discharge in that location.
- Scrub any mold-damaged areas clean. If the paint finish is harmed, prime with a stain-covering primer, then repaint. Keep an eye out for recurring problems.
- If closets contain moldy surfaces or contents, provide greater air exchange with the adjacent room using grilles or undercuts in the door. Reduce clutter in the closet.

Flooding Events

If a flood occurs in the home, proceed safely...

- Beware of drowning, electrical shock, chemical and biological contamination, vermin (snakes, rats, etc.), and emotional distress.
- If materials are cleaned and dried within a few days after flooding, they can usually be salvaged.
- Soaked drywall and soaked fiberglass or cellulose insulation must be disposed of. Exercise care in handling fiberglass insulation.
- Concrete, masonry, wood, and closed-cell foam materials can usually be scrubbed or scraped clean and salvaged (see *How to Get Special Help/Finding Equipment*).

Partnerships

The sources of mold and moisture problems are not always obvious, nor are they always simple to resolve. In some situations, creating viable partnerships is the best way to resolve problems that homeowners or renters cannot handle on their own. These partnerships can be formed by working with other agencies at the federal, tribal, and state levels. These agencies can often provide technical information and assistance, funding, and help in locating the services of specialized professionals who can resolve environmental conditions.

The following section describes some of the key programs and technical assistance resources that are available at the time of this Guide's publication. We have organized the descriptions by affiliation; that is, Federal-, Tribal-, and State-based resources, with a fourth subsection titled Other Entities that covers consultants, contractors, non-profits, educational and medical organizations, and resources. Depending on the conditions to be addressed, partnering with one or more of these entities may be required.

Federal Resources

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

Office of Native American Programs (ONAP)

NAHASDA Funds

The Native American Housing Assistance and Self-Determination Act of 1996 (NAHASDA) requires HUD to make grants on behalf of Indian Tribes to carry out affordable housing activities. NAHASDA funds can be used to aid families and individuals seeking affordable homes in safe, healthy environments – essential elements in the effort to improve housing conditions. NAHASDA assistance is provided in a manner that recognizes the right of tribal self-governance.

Eligible affordable housing activities include acquisition, new construction, reconstruction, and moderate or substantial rehabilitation of affordable housing. According to NAHASDA, proceeds from the sale of homeownership units can be used for any housing activity, community facility, or economic development activity that benefits the community. Refer to www-domino.hud.gov/ihp/newhome.nsf for the NAHASDA homepage, or call (800) 366-6827 and choose option 4 to connect to the ONAP system hotline.

Partnerships *(continued)*

Indian Community Development Block Grant Program (ICDBG)/Imminent Threat Funding

The primary objective of this program is to provide competitive funding for the development of viable Indian and Alaskan Native communities, including the creation of decent housing, suitable living environments, and economic opportunities. The program also provides funding for identified imminent threats. Imminent threat funding is available under specific circumstances: to alleviate or remove conditions that have been identified as a threat to the health or safety of tribal community members and that require an immediate solution. Applicants must provide information showing that an emergency situation exists or would exist if the problem(s) were not addressed. Funds may only be used to address imminent threats that are not of a recurring nature, and that represent a unique and unusual circumstance that impacts an entire service area. For more information on ICDBG Imminent Threat Funding, contact the Eastern/Woodlands Office of Native American Programs at (800) 735-3239.

Office of Healthy Homes and Lead Hazard Control

Healthy Homes Demonstration and Education Program

U.S. HUD's Healthy Homes Demonstration and Education Program develops, demonstrates, and promotes cost-effective, preventive measures designed to correct multiple safety and health hazards in the home environment that can result in serious diseases and injuries in children. The Program also supports effective hazard assessment and intervention methods, as well as projects focusing on public education and outreach. During each fiscal year, the Program awards grants and/or cooperative agreements to state, local, and tribal governments, as well as to not-for-profit and for-profit organizations.

HUD is very interested in reducing health threats to residents – especially those affecting children. Goals include:

- Mobilizing public and private resources to enable cooperation among all levels of government, the private sector, and community-based organizations in the development of promising, cost-effective methods for identifying and controlling housing-based hazards.
- Fostering sustainable programs at the local level that will continue to prevent – and where they occur, to minimize and control – housing-based hazards in low- and very-low income residences when HUD funding is exhausted.

Partnerships *(continued)*

Tribal entities will be afforded considerable latitude in designing and implementing preventive and corrective home safety and health measures; especially those which help prevent serious diseases and injuries in children.

The following direct activities are eligible under this grant program:

- 1) Performing evaluations of eligible housing to determine the presence of housing-based hazards (e.g., mold growth, allergens, unvented appliances, exposed steam pipes or radiators, deteriorated lead-based paint) through the use of generally accepted testing procedures.
- 2) Conducting medical examinations of young children for conditions caused or exacerbated by exposure to hazards where this is considered essential to the project, and where alternative funding sources are unavailable to cover these costs.
- 3) Conducting housing interventions to remedy existing housing-based hazards and address conditions that could result in their recurrence.
- 4) Carrying out temporary relocation of families and individuals, when necessary, during the intervention period.
- 5) Performing medical testing.
- 6) Undertaking housing rehabilitation activities that are specifically required to carry out effective control of housing-based hazards, and without which the intervention could not be completed and maintained.
- 7) Conducting clearance testing for lead hazard control activities and analysis for lead, mold, carbon monoxide, and/or other toxins as appropriate, in keeping with generally accepted standards or criteria.
- 8) Carrying out architectural, engineering, work specification development, and other construction management services to control housing-based hazards and to remedy existing hazards.
- 9) Providing training on safe maintenance practices to homeowners, renters, painters, remodelers, and housing maintenance staff people working in low- or very-low income housing.
- 10) Providing cleaning supplies for hazard intervention and hazard control.
- 11) Conducting general or targeted community education programs on environmental health and safety hazards.

For more information, contact HUD's Office of Healthy Homes and Lead Hazard Control at (202) 755-1785 ext. 126, and at www.hud.gov, which provides a link to the Office's home page.

Partnerships *(continued)*

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Indian Health Service

Indian Health Service is a public health services agency within the U.S. Department of Health and Human Services. Indian Health Service is responsible for providing federal health services to American Indians and Alaskan Natives. The goal of Indian Health Service is to ensure the availability of comprehensive health services for AIAN individuals and to raise their health status to the highest possible levels. Either directly or through tribal governments, Indian Health Service administers health clinics and environmental health departments in tribal areas. In situations where medical issues arise, it is strongly recommended that an appropriate health care professional be consulted. Appendices A and B contain listings of useful IHS contacts; you may also call (301) 443-1083 for assistance.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

General Assistance Program (GAP)

The purpose of the General Assistance Program is to strengthen the tribes' ability to manage environmental programs. The program allows tribes to create a reservation-based position specifically charged with handling environmental issues. The EPA provides general assistance grants to tribal governments and inter-tribal consortia for planning, developing, and establishing the capability of implementing environmental protection programs in Indian Country. For more information, see www.epa.gov/indian or contact (202) 260-9840.

Indoor Environments Division

This office provides regional Indoor Air Quality coordinators to assist with technical issues. See www.epa.gov/iaq or call (800) 438-4318 for the contact information of the coordinator serving your area. For information on mold, see www.epa.gov/iaq/pubs/moldresources.html.

CENTERS FOR DISEASE CONTROL (CDC)

The Centers for Disease Control and Prevention (CDC) is recognized as the leading federal agency responsible for protecting the health and safety of people at home and abroad, providing credible information to enhance health decisions, and promoting better health through strong partnerships. CDC serves as a national clearinghouse for developing and applying disease prevention and control techniques, as well as for information on

Partnerships *(continued)*

environmental health and educational activities designed to improve the health of the people of the United States. Contact CDC in Atlanta, GA at (404) 639-3311, or see www.cdc.gov.

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

The Federal Emergency Management Agency is an independent agency of the federal government. FEMA's mission is to reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response, and recovery. In this capacity, FEMA provides support to homeowners and communities in reducing losses associated with flood damage. Contact FEMA in Washington, D.C. at (202) 646-2500, or see www.fema.gov.

U.S. DEPARTMENT OF AGRICULTURE – RURAL DEVELOPMENT

The mission of the U.S. Department of Agriculture's Rural Development office is to improve the economy and quality of life for those living in rural areas, including those represented by tribal governments. Through financial programs, the USDA RD supports health clinics, housing, and emergency service facilities. Loans, grants, and loan guarantees are provided for single- and multi-family housing. Business loans and technical assistance is also provided. For further information, notices of funding availability, and a listing of field office locations, contact (202) 720-4323, or see www.rurdev.usda.gov

FEDERAL HOME LOAN BANK

The Federal Home Loan Bank System is a government-sponsored enterprise that offers affordable housing and community development lending services. It provides long- and short-term advances on the security of many types of mortgages, makes advances to member financial institutions at lower interest rates, and provides low-cost advances to members to support affordable housing and community investment programs. The Federal Home Loan Banks are government-chartered member-owned corporations. To find the FHL bank serving your area, contact (202) 408-2500 or see www.fhfb.gov/FHLBSys/FHLBS_districts.htm.

Partnerships *(continued)*

Tribal Resources

Housing Authorities (HAs) and Tribally Designated Housing Entities (TDHEs)

HAs and TDHEs are in a middle position between those responsible for building the housing (designers, general contractors, roofers, carpenters, electrical and plumbing contractors, excavators, and landscapers) and those living in the finished homes. They recognize that residents expect a dry home and that residents can play a role in keeping the home dry and mold-free. Through clear communication and active involvement, HAs and TDHEs can also help ensure that construction practices are appropriate.

Persistent mold can be a continuing source of annoyance, and may be associated with effects ranging from simple irritation to allergies, and more rarely, to hypersensitivity disease. Residents may report allergies, infections, fatigue, or childhood or adult onset asthma, which they may attribute to mold in their homes. It may not be possible to determine whether mold is the cause of these reported symptoms.

Building cooperation between residents, HAs, and TDHEs can help speed appropriate responses to mold and moisture problems. Renters and homeowners should know that moldy conditions they have not been able to correct themselves are to be reported to housing managers (for rental units) or appropriate tribal officials (for homeownership units) for prompt repairs.

Tribal housing authorities can:

- Ensure that residents understand appropriate reporting procedures;
- Encourage residents to provide notification in writing of any mold or moisture problems;
- Consider free distribution of equipment (such as dehumidifiers and cleaning supplies) to residents.

Tribal housing authorities can check for evidence of moisture and mold in rental units every time an annual home assessment is completed. These assessments are prepared as part of the annual housing quality standard inspections. Findings should be recorded in writing and with photographs, noting locations on floorplans whenever possible. This will allow HAs and TDHEs to track progress for each house, and to identify possible trends in groups of houses showing evidence of mold.

Tribal communities may also administer their own environmental offices and health clinics. Brief descriptions of these entities follow.

Partnerships (*continued*)

Environmental Offices

Environmental offices have been established to provide environmental protection in tribal communities. Many of these offices are funded by the EPA's GAP Program (referenced above). The EPA works with tribes to develop environmental programs that are tailored to individual tribal needs.

Health Clinics

Tribal clinics provide health care services to eligible Native American and Alaskan Native people. Members of tribal households who are experiencing health problems should see an appropriate health care professional to assess their health condition.

AMERIND Risk Management Corporation

AMERIND offers property and casualty insurance for tribal governments, tribally designated housing entities, and their subsidiaries. AMERIND also provides products and services for tribal homeowners and renters. They contract with independent claim adjusters across the U.S. to investigate and reach initial settlements for claims reported by tribes covered by their coverage. Property coverage does not cover most cases of water damage and mold. However, AMERIND does provide to its membership Flood and Earthquake coverage with special limits and deductibles. AMERIND's definition of a flood is less restrictive than FEMA's. Generally speaking, a 'flood' means surface water, waves, tides, tidal water or tidal wave, overflow of streams or other bodies of water, or spray from any of the foregoing; weather-driven or not.

Flood does not include loss caused by any of the following:

- Water that backs up through sewer or drains;
- Water below the surface of the ground, including that which exerts pressure on or leaks through sidewalks, driveways, foundations, framed walls, or floors;
- Mudslide or mudflow.

AMERIND investigates each claim filed individually in order to apply the proper coverage, limits, and deductibles. AMERIND is committed to coordinating investigations, claim settlements, and defense with the member Housing Authorities and Tribally Designated Housing Entities (TDHEs).

Partnerships *(continued)*

All losses, including the peril of flood, should immediately be reported to AMERIND. Losses not reported to AMERIND within one year of the date of loss are not considered a covered loss. AMERIND's main office, which can be contacted for membership inquiries and procedural questions related to damage reporting, is:

AMERIND Risk Management Corporation
6201 Uptown Blvd., Suite 100
Albuquerque, NM 87110
(505) 837-2290
(505) 837-2053 (fax)
www.amerind-corp.org

State Resources

State health and environmental departments are often the best sources of information on regional programs addressing mold. State health departments may have community and environmental health specialists available who are trained to provide health inspections of homes, assessments of the level and type of molds, and health information and education on mold health concerns. State housing departments may maintain listings of technical experts capable of performing mold clean-up and housing repairs, and state health and housing departments may offer program assistance that can help resolve moldy conditions identified in the home. Check the Blue Pages of your telephone directory for appropriate listings.

Other Entities

Cleaning up moldy conditions in homes with serious moisture problems may require the expertise of technical service providers and environmental specialists. The following is a general listing of technical service providers.

Mold Specialists (Indoor Air Quality or Indoor Environmental Quality)

Mold specialists are trained to inspect mold conditions in homes, provide instructions on mold clean-up and removal, and offer technical support on indoor air quality issues. If requested, they may also conduct microbial sampling to confirm the presence and type of molds. See *How to Get Special Help/Finding Equipment* for contact information on industrial hygienists, sampling, and laboratories.

Partnerships *(continued)*

Mold Specialist (Building/Structural Analysis)

Mold specialists in building/structural analysis are trained to inspect building structures and identify the source of the mold problems, produce plans for mold removal and any needed structural repairs to the home, and provide cost estimates for the plans presented. They often include building inspectors, civil/structural engineers, and architects specializing in building technology.

Building Contractors

Building contractors provide home renovation services and/or new construction.

Non-Profits / Educational / Medical

The following organizations can provide additional information, assistance, and resources:

American Lung Association

For information on allergies and asthma, see www.lung.usa.org

American Academy of Allergy, Asthma & Immunology

For a physician referral directory and information on allergies and asthma, see www.aaaai.org

American College of Occupational and Environmental Medicine

This organization provides referrals to physicians who have experience with environmental exposures. Visit www.acoem.org for more information.

How to Get Special Help/Finding Equipment

FINDING ANSWERS TO BUILDING QUESTIONS

Asphalt shingles and roof flashing :

Asphalt Roofing Manufacturers Association (ARMA www.asphaltroofing.org)
National Roofing Contractors Association (NRCA www.nrca.net)

Other types of roofing and low-slope roofs :

National Roofing Contractors Association (NRCA www.nrca.net)

Grading on steep sites :

Geotechnical engineering services may be required. Check local Yellow Pages for these types of services.

Drainage and underground water control in clay and ledge :

Geotechnical engineering services may be required. Check local Yellow Pages for these types of services.

CLEAN-UP ADVICE

Procedures for cleaning up after a flood :

See <http://www.epa.gov/iedweb00/pubs/flood.html>

Procedures for salvaging wet carpet :

See "Caring for Water-Damaged Carpet"
Carpet and Rug Institute (CRI www.carpet-rug.com)

Procedures for salvaging water-damaged items of special value :

Institute of Inspection, Cleaning, and Restoration Certification (IICRC, www.iicrc.com)

How to Get Special Help/Finding Equipment

EQUIPMENT, GEAR, AND LABS

Purchasing HEPA vacuum cleaners:

See the Carpet and Rug Institute's listing of tested vacuum cleaners for models to buy at www.carpet-rug.com.

Purchasing moisture meters and borescopes (borescopes are costly; they can also be rented from equipment rental companies):

See Equipment Suppliers such as Grainger, Inc. (www.grainger.com) or Professional Equipment (www.professionalequipment.com)

Purchasing protective gear, including respirators:

See better hardware stores in your area.

Sampling and labs:

Hiring a professional to collect environmental samples in the house
American Industrial Hygiene Association (AIHA www.aiha.org)
Search for Certified Industrial Hygienists with special indoor air quality experience.

Laboratories for analyzing mold samples:

American Industrial Hygiene Association (AIHA www.aiha.org)
AIHA certifies laboratories that analyze environmental samples for mold.
Currently, there are less than a dozen accredited laboratories in this program.

Appendix A: IHS Nashville Area Offices, Service Units, and Sanitarians

NASHVILLE AREA INDIAN HEALTH SERVICE

711 Stewarts Ferry Pike
Nashville, TN 37214-2634

States Served: Eastern United States

Telephone No.: (615) 467 + Ext.
Office Hours: 7:00 AM – 5:00 PM
Time Zone: Central
Main No.: (615) 467-1500
Fax: (615) 467-1501

AREA OFFICE

OFFICE OF THE DIRECTOR

Area Director	Michael D. Tiger	1505
Chief Medical Officer	Roy S. Kennon, MD	1531

OFFICE OF PUBLIC HEALTH

Director	Byron Jasper, DDS	1508
Secretary	Rhonda Mattern	1530

OFFICE OF ENVIRONMENTAL HEALTH & ENGINEERING

Director	Richie Grinnell	1511
Secretary	Cindy Yahola-Gallegos	1512
FES Chief	Ray Behel (Acting)	1514
EHS Chief	Craig Shepherd	1536
EHS Institutional Sanitarian	(Vacant)	1535
FES Support Services Specialist	Bill Caldwell	1613
Support Services Specialist	Rexalene Steve	1615
SFC Chief	Ken Green (Acting)	1537
District Engineer	Steve Ring (Acting)	1616
EHS District Sanitarian	Susan McCracken	1535
Secretary	Sandy Kingbird	1535

OEHE DISTRICT & FIELD OFFICES

ATMORE FIELD OFFICE

Atmore, AL
Phone: (334) 368-8265

Construction Inspector Joe Watson

BANGOR DISTRICT OFFICE

Bangor, ME
Phone: (207) 941-9921

District Engineer Phil Rapp
Construction Inspector Al Weeks

CHEROKEE FIELD OFFICE

Cherokee, NC
Phone: (828) 497-1835

Environmental Engineer Greg Robinson
Construction Inspector John Welch

HOLLYWOOD FIELD OFFICE

Hollywood, FL
Phone: (954) 961-2740

Senior Field Engineer Javier Franco

LAFAYETTE FIELD OFFICE

LaFayette, LA
Phone: (337) 262-6812

Senior Field Engineer Darrall Tillock

MANLIUS FIELD OFFICE

Manlius, NY
Phone: (315) 682-3167

District Sanitarian Mickey Rathsam
Senior Field Engineer Lee Jackson
Construction Inspector Tom Witchley

SERVICE UNITS

ALABAMA-COUSHATTA TRIBE OF TEXAS

Hwy 190 – Route 3 Box 640
Lewiston, TX 77351
(936) 563-2058

Health Director Richard Cordes

AMERICAN INDIAN COMMUNITY HOUSE

708 Broadway Street 8th Floor
New York, NY 10003
(212) 598-0100

Health Director Anthony Hunter

AROOSTOOK BAND OF MICMAC

8 Northern Road
Presque Isle, ME 04769
(207) 764-7219

Health Director John Quелlette

CATAWBA INDIAN NATION

3596 Passmore Drive
Catawba, SC 29704
(803) 366-4792

Health Director Doniece Bagley

CAYUGA NATION OF INDIANS

P.O. Box 11
Versailles, NY 14168
(716) 532-4847

Contact Person Sharon LeRoy

CHEROKEE SERVICE UNIT

PHS Indian Hospital
Cherokee, NC 28719
(828) 497-9163

Health Systems Administrator Edwin McLemore
Administrative Officer Arnold Wachacha
Clinical Director Mary Anne Farrell, MD

Unity Regional Youth Treatment Center

P.O. Box C-201
441 N. Sequoyah Trail Drive
Cherokee, NC 28719
(828) 497-3958

Director Margaret Jenks
Administrative Officer Terry Allison

CHITIMACHA TRIBE OF LOUISIANA

3231 Chitimacha Trail
Charenton, LA 70523
(337) 923-9955

Health Director Madeline Phelps

COUSHATTA TRIBE OF LOUISIANA

P.O. Box 519
Elton, LA 70532
(337) 584-2208

Health Director Margie Turner

EASTERN BAND OF CHEROKEE INDIANS

P.O. Box 666
Cherokee, NC 28719
(828) 497-7460

Health Director Casey Cooper

HOULTON BAND OF MALISEET

RR #3 Box 460
Houlton, ME 04730
(207) 532-2240

Health Director Bonita Marble

JENA BAND OF CHOCTAW

1849 Cowart Street (P.O. Box 14)
Jena, LA 71342
(318) 992-2717

Health Director Christine Norris

LIFELINE FOUNDATION, INC.

106 West Clay St.
Baltimore, MD 21201
(410) 837-2258

Program Director Susan Roth

MASHANTUCKET PEQUOT TRIBAL NATION

75 Route 2, P.O. Box 3060
Mashantucket, CT 06339
(860) 396-7558

Director, HHS Annette Menihan

MICCOSUKEE CORPORATION

US 41 Tamiami Trail
P.O. Box 440021
Miami, FL 33144
(305) 223-8380

Health Director Cassandra Osceola

MISSISSIPPI BAND OF CHOCTAW INDIANS

210 Hospital Circle
Philadelphia, MS 39350
(601) 656-2211

Health Director Jimmy Wallace

MOHEGAN TRIBE OF INDIANS

5 Crow Hill Road
Uncasville, CT 06382
(860) 862-6192

Health Director Marilyn Malerba

NARRAGANSETT INDIAN TRIBE

4533 South County Trail Route 2
Charlestown, RI 02813
(401) 364-1268 Ext. 11

DHHS Director Autumn Leaf Spears

NORTH AMERICAN INDIAN CENTER

105 South Huntington Avenue
Jamaica Plains, MA 02130
(617) 232-0343

Urban Program Director Barbara Namais

ONEIDA INDIAN NATION

2 Territory Road
Oneida, NY 13421
(315) 363-4640

Health Director Charmine Fredrick

ONONDAGA NATION OF NEW YORK

Hemlock Rd. – Box 319B
Nedrow, NY 13120
(315) 492-4210

Contact Person Chief Irving Powless, Jr.

PASSAMAQUODDY TRIBE INDIAN TOWNSHIP

1 Newell Drive Box 97
Princeton, ME 04668
(207) 796-2321

Health Director Elizabeth Neptune

PASSAMAQUODDY PLEASANT POINT

P.O. Box 351 – Route 190
Perry, ME 04667
(207) 853-0644

Health Director (Acting) Sandra Yarmal

PENOBSCOT INDIAN NATION

5 River Road
Old Town, ME 04468
(207) 827-6101

Health Director Pat Knox-Nicola

POARCH BAND OF CREEK INDIANS

5811 Jack Springs Road
Atmore, AL 36502
(334) 368-9136

Health Administrator Buford Rolin

SEMINOLE TRIBE OF FLORIDA

3006 Josie Billie Avenue
Hollywood, FL 33024
(954) 962-2009

Health Director Connie Whidden

SENECA NATION OF INDIANS

Lionel R. John Health Center
987 RC Hoag Drive, P.O. Box 500
Salamanca, NY 14779
(716) 945-5894

Health Director (Acting) Adrian Stevens

ST. REGIS MOHAWK TRIBE

412 State Highway 37
Akwesasne, NY 13655
(518) 358-3141

Health Director Rita LaFrance

TECUMSEH HOUSE

107 Fisher Avenue
Roxbury, MA 02120
(617) 731-3366

Program Director John Szwyd

TUNICA-BILOXI TRIBE

Highway One South, P.O. Box 331
Marksville, LA 71351
(318) 253-6100

Health Director Irene Gonzales

WAMPANOAG TRIBE OF GAY HEAD

20 Black Brook Road
Aquinnah, MA 02535
(508) 645-9265

Health Director Fredrick Rundlet

SANITARIANS

ENVIRONMENTAL HEALTH SERVICES BRANCH

Nashville Area Office, Indian Health Service
711 Stewarts Ferry Pike
Nashville, TN 37214
615/467-1535 – FAX (615) 467-1569
Email: craig.shepherd@mail.ihs.gov
kit.grosch@mail.ihs.gov

Director Craig A. Shepherd
Institutional Environmental
Health Officer Kit Grosch

INDIAN HEALTH SERVICE

122 East Seneca Street
Manlius, New York 13104
(615) 315-3167 – FAX (315) 682-3189
Email: michael.rathsam2@mail.ihs.gov

Northern District
Environmental Health Officer Mickey Rathsam

MISSISSIPPI BAND OF CHOCTAW INDIANS

P. O. Box 6010
Philadelphia, MS 39350
(601) 656-4031 – FAX (601) 656-1992

Tribal Sanitarian Jerry Hill

NASHVILLE AREA OFFICE

711 Stewarts Ferry Pike
Nashville, TN 37214
(615) 467-1535 – FAX (615) 467-1586
Email: susan.mccracken@mail.ihs.gov

Southern District
Environmental Health Officer Susan McCracken

POARCH BAND OF CREEK INDIANS

5811 Jack Springs Road
Atmore, AL 36502
(334) 368-9136 – FAX (334) 368-1026
Email: lmorgan@nspbci.nashville.ihs.gov

Tribal Sanitarian Leon Morgan

SEMINOLE TRIBE OF FLORIDA

6300 Stirling Road
Hollywood, FL 33024
(954) 966-6300 – FAX (954) 967-3486

Director EHS Anthony Thomas

Appendix B: IHS Bemidji Offices, Service Units, and Sanitarians

**BEMIDJI AREA
INDIAN HEALTH SERVICE**

522 Minnesota Ave., NW
Bemidji, MN 56601

Telephone No.: (218) 444 + Ext.
Office Hours: 8:00 AM – 4:30 PM
Time Zone: Central
Fax: (218) 444-0457

States Served: MN, MI, WI

AREA OFFICE

OFFICE OF THE DIRECTOR

Area Director Kathleen Annette, MD0451

OFFICE OF CLINICAL SERVICES

Clinical Services Director Dawn Wyllie, MD, MPH0491

OFFICE OF ENVIRONMENTAL HEALTH

Acting Director Victor Mosser0505
Chief Bruce M. Etchison0501
Assistant Chief Diana Kuklinski0503

OEHE DISTRICT & FIELD OFFICES

Minnesota District Office
522 Minnesota Ave., NW
Bemidji, MN 56601
(218) 444-0520

District Engineer, MDO Craig Larson
District Sanitarian Wayne Potter

Rhineland Field Office
P.O. Box 537
Rhineland, WI 54501
(715) 362-5145

Ashland Field Office
2800 Lake Shore Drive East
Ashland, WI 54806
(715) 682-5531

Field Health Office
3601 Mackinaw Trail
Sault Ste. Marie, MI 49783
(906) 635-4208

SERVICE UNITS

Chief Medical Officer Dawn Wyllie, MD, MPH218-759-3351
Physician Recruiter Tony Buckanaga218-759-3415

CENTRAL WISCONSIN SERVICE UNIT

Ho Chunk Nation Health Department
PO Box 636, 25 N. 2nd Street
Black River Falls, WI 54615
(715) 284-7548 or 7830

Health Director Hattie Walker

EASTERN MICHIGAN SERVICE UNIT

Huron Potawatomi Band
2221 1-1/2 Mile Road
Fulton, MI 49052
(616) 729-5151

Health Director Paul Cloutier

Little River Band Of Ottawa
Contract Health Services
Little River Band Health Clinic
310 9th Street
Manistee, MI 49660
(616) 723-8288

Health Director Charles Fisher

Little Traverse Band of Odawa
P.O. Box 246-1345, U.S. 31N
Petoskey, MI 49770
(616) 348-8218

Health Director Arlene Naganashe

Pokagon Band Of Potawatomi
210 S. Front Street
Dowagiac, MI 49047
(616) 782-4141

Health Director Christine Daugherty

GREATER LEECH LAKE SERVICE UNIT

PHS Indian Hospital
R.R. 3, Box 211
Cass Lake, MI 56633
(218) 335-2293

Service Unit Director Luella Brown, RN
Clinical Director Mark Becker

Leech Lake Band
Route 3 - Box 100
Cass Lake, MN 56633
(218) 335-8215

Health Director Doris Jones

MILLE LACS SERVICE UNIT

Mille Lacs Band
HCR 67, Box 241
Onamia, MN 56359
(320) 532-4163

Executive Director of
Health & Human Services Sharon Gislason

RED LAKE SERVICE UNIT

PHS Indian Hospital
Red Lake, MN 56671
(218) 679-3912

Service Unit Health Director Essimae Stevens
Clinical Director John Robinson

Red Lake Comp. Health Service
Red Lake, MN 56671
(218) 679-3316

Health Director Oran Beaulieu

WHITE EARTH SERVICE UNIT

PHS Indian Health Center
White Earth, MN 56591
(218) 983-4300

Health Center Director Jon McArthur
Clinical Director Howard Hayes, MD

White Earth Band
P.O. Box 418
White Earth, MN 56591
(218) 983-3285

Health Director JoEllen Anywaush

TRIBALLY OPERATED FACILITIES

BAD RIVER HEALTH SERVICES

P.O. Box 39
Odanah, WI 54861
(715) 682-7137

Health Director Mary Bigboy

BAY MILLS INDIAN COMMUNITY

12099 W. Lakeshore Drive
Brimley, MI 49715
(906) 248-3204

Health Director Laurel Keenan

BOIS FORTE TRIBAL CLINIC

P.O. Box 16
Nett Lake, MN 55772
(218) 757-3295

Health Director Jeneal Goggleye

FOREST CO. POTAWATOMI COMMUNITY

P.O. Box 396 HWY 8 East
Crandon, WI 54520
(715) 478-7300

Health Administrator Dori Shawano

GRAND PORTAGE BAND

P.O. Box 428
Grand Portage, MN 55605
(218) 475-2235

Health Director Lorna Turner

GRAND TRAVERSE OTTAWA/CHIPPEWA

2605 NW Bayshore Drive
Suttons Bay, MI 49682
(616) 271-5256

Health Director Ruth Bussey

HANNAHVILLE INDIAN COMMUNITY

N14911 Hannahville Bl. Road
Wilson, MI 49896
(906) 466-2782

Health Director Dennis Wiethoff

KEWEENAW BAY INDIAN COMMUNITY

102 Superior Avenue
Baraga, MI 49908
(906) 353-8666 Ext. 10

Health Director John Seppanen

LAC COURTE OREILLES TRIBAL CLINIC

Route 2, Box 2750
Hayward, WI 54843
(715) 634-4153 or 4795

Health Director Don Smith

LAC VIEUX DESERT BAND

E-23560 Choate Road
Watersmeet, MI 49969
(906) 358-4588

Health Administrator Ruby Camp

LOWER SIOUX COMMUNITY COUNCIL

P.O. Box 308, Route 1
Morton, MN 56270
(507) 697-6185

Health Director Teri Schemmel

MATCH-E-BE-NASH-SHE-WISH POTTAWATOMI

P.O. Box 218
Dorr, MI 49323
(616) 681-8830

Tribal Operations Manager John Shagonaby

MENOMINEE TRIBAL CLINIC

P.O. Box 970
Keshena, WI 54135
(715) 799-5482

Health Director Jerry Waukau

MIN-NO-AYA-WIN CLINIC

927 Trettel Lane
Cloquet, MI 55720
(218) 879-1227

Health Director Phil Norrgard

NIMKEE MEMORIAL WELLNESS CENTER

2591 S. Leaton Road
Mt. Pleasant, MI 48858
(517) 775-4600

Health Director Gail George

ONEIDA COMMUNITY HEALTH CENTER

P.O. Box 365
Oneida, WI 54155
(920) 869-2711

Health Director Deanna Bauman

PETER CHRISTENSEN HEALTH CENTER

450 Old Abe Road
Lac du Flambeau, WI 54538
(715) 588-3371

Health Administrators Robin Carufel/Leon Valliere

PRAIRIE ISLAND COMMUNITY COUNCIL

5636 Sturgeon Lake Road
Welch, MN 55089
(651) 385-4152

Health Director Jody Gamph

RED CLIFF HEALTH SERVICES

P.O. Box 529
Bayfield, WI 54814
(715) 779-3707

Health Director Patricia Deragon

SAULT STE. MARIE HEALTH & HUMAN SERVICES

2684 Ashmun Street
Sault Ste. Marie, MI 49783
(906) 632-5200

Health Director Russell Vizina

SHAKOPEE MDEWAKANTON BUSINESS COUNCIL

2320 Sioux Trail N.W.
Prior Lake, MN 55372
(612) 445-8900

Health Director Susan Blomker

SOKAOGON CHIPPEWA COMMUNITY

P.O. Box 616
Crandon, WI 54520
(715) 478-5180

Health Administrator Judy Anaya

ST. CROIX HEALTH SERVICES

P.O. Box 287
Hertel, WI 54845
(715) 349-2195

Health Director Phyllis Lowe

STOCKBRIDGE-MUNSEE HEALTH CENTER

P.O. Box 86-N8705
Moh He Con Nuk Road
Bowler, WI 54416
(715) 793-4144

Health Director Joann Schedler

UPPER SIOUX COMMUNITY

Box 147
Granite Falls, MN 56241
(320) 564-2360

Health Administrator Laurie Gardner

SANITARIANS

ENVIRONMENTAL HEALTH DEPT.

3759 W. Mason St., Suite 5, Box 365
(Ridgeview Plaza)
Oneida, WI 54155
(920) 497-5812 x 170 – FAX (920) 496-7883

Tribal Sanitarian Jen Falck

ENVIRONMENTAL SERVICES – MENOMINEE RESERVATION

P.O. Box 670 – Hwy 47 Forestry Center
Keshena, WI 54135
(715) 799-6152 – FAX (715) 799-6153
Director Gary Schuettpeiz

HO-CHUNK NATION

P.O. Box 636, 720 Red Iron Road
Black River Falls, WI 54615
(715) 284-7830 – FAX (715) 284-9592
Tribal Sanitarian Carol Rollins

INTER-TRIBAL COUNCIL OF MICHIGAN, INC.

Field Health Office
3601 Mackinaw Trail
Sault Ste. Marie, MI 49783
(906) 635-4208 – FAX (906) 635-4212
Tribal Sanitarian Inga Black

LEECH LAKE RT HEALTH DIVISION

Rt. 6530, Hwy 2 NW
Cass Lake, MN 56633
218/335-8215 – FAX 218/335-8219
Tribal Sanitarian Gregg Anderson

MINNESOTA DISTRICT OFFICE

522 Minnesota Avenue, NW
Bemidji, MN 56601
218/444-0523
SU Sanitarian Stephen Piontkowski
Email: Steve.Piontkowski@mail.IHS.GOV

MINNESOTA DISTRICT OFFICE

522 Minnesota Avenue, NW
Bemidji, MN 56601
218/444-0524
District Sanitarian Wayne Potter
Email: Wayne.Potter@mail.IHS.GOV

NORTHERN NATIVE AMERICAN HEALTH ALLIANCE

Environmental Health Services
P.O. Box 529 (Hwy 13)
Bayfield, WI 54814
(715) 779-3709 – FAX (715) 779-3777
R.S. Richard A. Reese
Email: dreese@cheqnet.com

PETER CHRISTENSEN HEALTH CENTER

450 Old Abe Road
Lac du Flambeau, WI 54538
(715) 588-9815 – FAX (715) 588-7884
Tribal Sanitarian Sandra Supinski
Email: ssupinsk@bjiao.bemidji.ihg.gov

PHS INDIAN HOSPITAL

Red Lake, MN 56671
218/679-3912 – FAX 218/679-3990
Tribal Sanitarian Mary Angell

RHINELANDER DISTRICT FIELD OFFICE

Indian Health Service
9A South Brown Street
Rhineland, WI 54501
(715) 365-5112 – FAX (715) 365-5113

District San/Injury Prevention Stewart Watson

RHINELANDER DISTRICT FIELD OFFICE

Indian Health Service
9A South Brown Street
Rhineland, WI 54501
(715) 365-5120 – FAX (715) 365-5113

SU Sanitarian Carolyn Garcia

SAULT STE. MARIE TRIBE

2864 Ashmun Street
Sault Ste. Marie, MI 49783
(906) 635-6050 x26061

R.S. Dan Tadgerson

WHITE EARTH HEALTH CENTER

P.O. Box 418
White Earth, MN 56591
(218) 983-6294 – FAX (218) 983-6217

SU Sanitarian Christopher W. Allen

Appendix C: Work Orders

In many cases, a work order will have to be prepared by the Housing Authority to repair a condition that results in mold growth. A work order directs either an employee or a contractor to complete one or more tasks, and describes:

- The location of the required work;
- The type of work;
- Date and time of receipt;
- Date and time issued to those performing the work;
- Date and time work is satisfactorily completed;
- Materials used to complete the repairs;
- Cost of the materials used;
- Cause and damage;
- Charges to the resident for resident-caused damages, if applicable.

Typically, work orders are entered into a log that describes the status of all work orders according to type (emergency or non-emergency), when issued, and when completed. This allows the HA to track problems and measure progress.

The type of work order will need to be identified:

- EMERGENCY, for circumstances posing an immediate threat to life, health, safety, or property.
- NON-EMERGENCY, for situations that do not constitute immediate threats.

Emergency situations may develop because of chronic conditions, and not necessarily because of a sudden event. For example, if the ground doesn't slope away from the house and water continually seeps in, an emergency situation may develop. A successful work order may involve tasks as simple as landscaping or as extensive as excavation and waterproofing.

Once the emergency work order is completed, Emergency Status Abated work orders may be issued. In some situations, temporary relocation of a resident family away from the emergency conditions in their unit may be appropriate and qualifies as an abatement of the emergency.

Other types of work orders, which can be used to prevent mold problems from developing, include:

1. **Cyclical**, for routine maintenance work that is done in the same way at regular intervals (e.g., replacing furnace filters, cleaning out site and roof storm drains, etc.).
2. **Preventive Maintenance**, for work done on a regularly scheduled basis in order to prevent breakdowns in individual units or major systems (e.g., inspection/cleaning/maintaining roofing and flashing, gutters and downspouts, boilers, etc.).
3. **Vacant Unit Turnaround**, for all work needed to make a unit ready for occupancy. Houses that are left vacant for long periods of time may become musty and moldy.

There are many other factors unrelated to mold that may need attention. In some cases, a decision to wait may be in order:

Deferred for Modernization – Sometimes, it is reasonable not to expend resources right away to fix a particular deficiency that will be addressed soon as part of a larger physical improvement program. However, there are clearly times when waiting will cause the mold problem to become much harder – and more expensive – to eradicate. For example, when there has been flooding, cleaning and drying should not be delayed.

Appendix D: References

Canada Mortgage and Housing Corporation. "Mold in Housing: An Information Kit for First Nations Communities" a joint publication of CMHC, Health Canada, and Indian and Northern Affairs Canada, and a leaflet, "First Nations Occupants' Guide to Mold," both published in 2001. *The kit is intended for inspectors, housing departments, tribes, health providers, occupants, and building trades, and includes basic information, the responsibilities of key players and the training they need, and specific guidance for housing providers. The leaflet is a convenient guide for tenants and homeowners.* CMHC also has an "About Your House" series, including these on-line documents: "Measuring Humidity in Your Home" (CE01), "After the Flood" (CE07), "Fighting Mold" (CE08), "The Importance of Bathroom and Kitchen Fans" (CE17), "Choosing a Dehumidifier" (CE27), and "The Renovation Project" (CE28), including "Before You Start Renovating Your Basement – Moisture Problems." *Simple guide sheets on key issues.* "Building Solutions – A Problem-Solving Guide for Builders and Renovators" see www.cmhc-schl.gc.ca. For the "About Your House" series, see www.cmhc-schl.gc.ca/publications/aboutyourhouse/index.html

California Department of Health Services, "Indoor Air Quality Info Sheet: Mold in My Home – What Do I Do?" July 2001. www.cal-iaq.org/mold0107.pdf *An update providing basic information to people who have experienced water damage in their home, describing health concerns, general guidelines on prevention, mold detection and cleanup.*

University of Minnesota, Department of Health & Safety, "Managing Water Infiltration into Buildings: A Systematized Approach for Remediating Water Problems in Buildings Due to Floods, Roof Leaks, Potable Water Leaks, Sewage Backup, Steam Leaks and Groundwater Infiltration" see www.dehs.umn.edu/iaq/flood.html. *This reference includes a water damage checklist, testing, a flowchart to evaluate water damaged building materials and furnishings, and flood-related links to other sites.*

Centers for Disease Control and Prevention, "Molds in the Environment" National Center for Environmental Health, see www.cdc.gov/nceh/asthma/factsheets/molds/molds.htm. September 1999. *Useful fact sheet on mold.*

Centers for Disease Control and Prevention, "Questions and Answers on Stachybotrys Chartarum and Other Molds" March 9, 2000 see www.cdc.gov/nceh/asthma/factsheets/molds/default.htm. *This is the latest information available from the federal authority responsible for investigating outbreaks of illness.*

New York City Department of Health, "Guidelines on Assessment and Remediation of Fungi in Indoor Environments." Bureau of Environmental & Occupational Disease Epidemiology, November 2000. See www.ci.nyc.ny.us/html/doh/html/epi/moldrpt1.html. *This 17-page guide is an update of original guidelines from 1993 that dealt with mold growth problems in several New York City buildings. It revises and expands those guidelines to include all types of mold, and provides a discussion of health issues, evaluation strategies and clean-up and control methods. It was developed by specialists in the fields of microbiology and health sciences, and has been widely cited on many mold remediation projects across North America.*

New York City Department of Health, "Facts about Mold." Bureau of Environmental & Occupational Disease Epidemiology, April 2000. See www.ci.nyc.ny.us/html/doh/html/ci/cimold.html. *This is a fact sheet for homeowners answering common questions about mold.*

Red Cross/Federal Emergency Management Agency, "Repairing Your Flooded Home," particularly Step 4, "Dry Out Your Home." See www.fema.gov/library/repfhm.pdf. *Guidelines on lowering humidity, sorting contents and discarding debris, how floodwaters affect your home, drain the ceilings and walls, dry the ceilings and walls, and dry the floors.*

Burge, H.A., Otten, J.A., "Fungi". In *Bioaerosols: Assessment and Control*, pp. 19.1 – 19.13, J. Macher, H.A. Ammann, H.A. Burge et al., eds. American Conference of Governmental Industrial Hygienists. ISBN 1-882417-29-1. Cincinnati, OH, 1999. *Characteristics, health effects, sample collection, sample analysis, data interpretation. Other chapters in this text (Chapter 10, measures to control indoor mold growth; Chapter 15, cleaning and remediation practices, and Chapter 24, recommendations on limiting exposures to mycotoxins) may also be consulted.*

U.S. Environmental Protection Agency, "Mold Remediation in Schools and Commercial Buildings." Office of Air and Radiation Indoor Environments Division. March 2001. See www.epa.gov/iaq/molds/graphics/moldremediation.pdf. *General overview with principles that can also be useful for homes.*

U.S. Environmental Protection Agency, "Healthy Indoor Air for America's Homes." Office of Air and Radiation Indoor Environments Division. See www.montana.edu/wwwcxair. *Educational material on mold and other indoor air quality topics.*

Lstiburek, Joseph. "Builder's Guide" series, 1997. Westford, MA: Building Science Corporation. *Construction details for buildings that perform better, for different climate zones throughout North America.*

