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## Pest Management Bulletin

Volume 9



### INSPECTING FOR SUBTERRANEAN TERMITES

The objective of this Pest Management Bulletin is to assist you in learning the basic skills required to inspect a single-family residence for subterranean termites. The results of a termite inspection should provide homeowners with recommendations for preventive or remedial actions to minimize economic loss from termites. Also, an inspection report should inform the reader of the structure's current termite infestation status.



In 2004, there were 12 states that required state-mandated forms for reporting subterranean termite inspection results. Many of the states requiring the use of state-specific forms also established rules or regulations addressing termite inspection methods.

**Technicians should be trained in termite biology, infestation recognition, local building regulations, inspection techniques and control measures.**



Recently, the National Pest Management Association (NPMA) released form NPMA-33, Wood-Destroying Insect Inspection Report. The form was adopted by the U.S. Department of Housing and Urban Development for use with HUD & VA loans where state-specific forms are not required. *Nothing in this Bulletin should be interpreted or understood to replace or modify the rules and regulations of your specific state or federal regulatory agencies.*



Subterranean termite inspections are sometimes referred to as wood-destroying insect (WDI) or wood-destroying organism (WDO) inspections. In both WDI and WDO inspections you may be looking for evidence of other wood-destroying insects besides subterranean termites, such as drywood termites, dampwood termites, wood-boring beetles, carpenter ants and carpenter bees. A WDO inspection may also require reporting the presence of wood-destroying fungi. Specific wood-destroying insect and organism inspections vary by area and state.



Proper inspections are a must. Termites can cause thousands of dollars of damage without detection, like hidden damage behind walls as shown above.



A worker termite.



A soldier termite hovers over a worker.



Alates or "swarmers."

Subterranean termites are the most destructive wood-destroying insects found in buildings throughout the United States. It is estimated that the annual cost to prevent, control and repair damage caused by subterranean termites exceeds \$2 billion. Because of this potentially significant economic damage, homeowners and homebuyers depend on the structural pest control industry for professional termite inspections.

The reasons for conducting a termite inspection can vary. In some cases, you may examine a house for a potential buyer or seller or a homeowner may have seen something that appeared to be termite activity and is seeking a professional opinion. Occasionally, a homeowner simply wants a home inspected for peace of mind. Another reason is to follow up a previous termite treatment. These inspections are typically done annually and usually include an additional one-year warranty extension. This type of inspection is called an annual renewal inspection.

Regardless of the reason for the termite inspection, it must be performed in a thorough and professional manner. Technicians should be trained in termite biology, infestation recognition, local building regulations, inspection techniques and control measures. In most cases, termite inspectors must have appropriate state licensing or certification to conduct termite inspections. They also must have a thorough knowledge of their state's termite inspection and control rules and regulations.

### TERMITE BIOLOGY

There are three primary forms of live termites. The most common is the worker termite, approximately one-fourth inch long, soft-bodied and creamy white in color. The next type is the soldier termite. This group is found scattered among worker termites; however, soldier termites are much fewer in number.

Their job is to protect the colony and they are easily distinguishable from worker termites by their large heads and mandibles.

**To prevent moisture loss and attack by predators, termites build mud shelter tubes when crossing open or exposed areas.**

The third form is the alate or swarmer. Once or twice a year, usually in the spring, alates fly or swarm out of the colony in search of mates and new nesting sites. This is how most new colonies are formed. Once the alates land, they break off their wings and begin to pair up and seek suitable nesting sites. A pair, one male and one female, will be the king and queen of a new colony.

Alates are black or dark brown in color, have two pair of equal-length wings and no constriction or waist between the thorax and abdomen. Alates also have straight, bead-like antennae. When specific species



**This large mud tube indicates long term termite invasion.**



**Termite damaged wood.**



**A flashlight is one of the most important tools needed for a thorough inspection.**



**Coveralls are perfect to wear as protective clothing.**

identification is necessary, alates with wings and soldiers are the best forms to collect.

Swarming termites are sometimes confused with swarming ants. However, the ant has elbowed antennae, two pair of unequal-length wings and a prominent constriction or waist between the abdomen and thorax. If you are not present during or shortly after a swarm, you may not see the swarmers; nevertheless, you should be able to locate their discarded wings. These can be found on windowsills, on the floor below windows and in spider webs.

### **SIGNS OF INFESTATION**

Subterranean termites require moisture to survive. If exposed to dry air, they will lose moisture quickly. To prevent moisture loss and attack by predators, termites build mud shelter tubes when crossing open or exposed areas. Six to eight inches of mud tubing can be built by a termite colony in a single night.

Mud tubes are among the most common signs of subterranean termite infestations. They can be found on exterior and interior foundation walls, under exterior siding, on piers or pillars, in cracks or joints between structural elements and just about anywhere termites decide to tube over something instead of eating through it.

Another sign of termite activity is damaged wood. Typically, wood damaged by subterranean termites has a characteristic look. Termites attack softer springwood, feeding with the grain, not across it. Galleries are usually covered with a mud-like substance, resembling dried oatmeal. In homes with plaster or gypsum board interior walls, small "pinholes" on the wall surface, often surrounded by mud, are another sign of termite activity.

Termite-damaged wood can be nearly destroyed on the inside while still appearing to be solid on the outside. Tapping on wood with the handle of a screwdriver or other blunt instrument will produce a dull sound if termites or other wood-destroying organisms have damaged the wood. Careful probing of suspected areas with a sharp instrument, such as an ice pick, can detect damaged wood beneath the surface. Also, the presence of bubbled paint may indicate termite-damaged wood.

A prerequisite for conducting any termite inspection is to have the tools necessary to perform a thorough inspection. The following are the minimum tools you should have: flashlight, clipboard with graph paper or inspection forms, pen, ice pick, screwdriver, mason's hammer, inspection mirror, moisture meter, tape measure or measuring wheel, ladder and a camera.

Personal protective clothing is also needed. This includes coveralls, bump hat, gloves, kneepads and dust mask. You may not need every piece of protective clothing or inspection tool for each inspection, but



**Sometimes the grade can obscure the foundation.**



**A basement foundation before the house frame is added.**



**A crawl space supported by a perimeter stem wall.**



**A crawl space with CMU pillars or piers.**

a well-trained professional termite inspector will have all of them available. There are several specialty tools that can be used to assist in finding both active termites and termite damage. These include listening devices, microwave movement detectors, thermal imaging devices, odor detectors and borescopes.

### **ELEMENTS OF CONSTRUCTION**

Obviously, all homes are constructed differently. In fact, there is greater variation in construction methods from one area of the country to another than there is in subterranean termite biology and behavior. A variety of roofing materials, siding systems and foundations are in use throughout the United States. As such, it is essential that termite inspectors be thoroughly familiar with the building practices and construction terminology used in their area.

Since most termite infestations begin at ground level, it is essential to recognize and understand the different types of residential foundations you can encounter. In residential construction, there are essentially three basic types of foundation: full basement, crawl space and slab-on-grade. Each of these has several variations that may be used in a particular part of the country.

A basement is the bottom full story of a house below the first floor. It may be partially or completely below grade. Typically, basement foundations have perimeter walls constructed of poured concrete or concrete masonry units (CMUs), also called concrete blocks. Columns or interior load-bearing walls may provide additional support.

The basement floor is poured separately. Typically, there is a joint where the floor meets the walls. This joint is usually visible in unfinished basements, but may be obscured in finished or carpeted basements. In either case, it is a common entry point for termites.

Crawl space foundations utilize a series of vertical piers or pillars and a perimeter stem wall to support the structure. This type of foundation creates a space between the floor joists and the earth. This open area under the house is called the crawl space. In a crawl space foundation, the piers or pillars and the stem wall typically rest on a poured concrete footing. The piers and stem wall can be constructed from a variety of materials including stone, brick, CMUs or poured concrete. Some crawl space structures do not have load bearing stem walls surrounding the crawl spaces. The entire foundation is comprised of the vertical piers and their footings. There are many variations of crawl space foundations throughout the country.

There are three basic types of slab-on-grade foundations: floating, supported and monolithic. In floating and supported slabs, a concrete or CMU foundation or stem wall is constructed first. The slab, which is poured later, will either float on the fill material or it will be supported around the perimeter by the stem wall. In either case, a joint is formed between the slab and stem wall; here, termites can enter the structure unseen.



**A supported or floating slab.**



**A joint between the foundation wall and basement where termites can enter.**



**A monolithic slab before the house frame is added.**



**A post-tension monolithic slab.**



**Termites can penetrate a home where pipes enter at a slab.**

Monolithic slabs have a perimeter-foundation beam and interior-grade beams. Once the site is excavated and prepared, the foundation beams and slab are formed in a single pour. When finished, the foundation beams and slab form a single or monolithic unit. In some parts of the country, monolithic foundations rest on a previously poured insulated concrete footing.

Monolithic foundation slabs typically have several vertical penetrations where termites may enter the structure unseen. The largest of these are called bath traps or tub drain cutouts. Most of the other penetrations occur where drain pipes, stack pipes or utilities enter or exit the house. Under some circumstances, such as multi-level slabs, wooden grade stakes may be left in the concrete. Termites can use these stakes to gain access into the wood framing above the slab.

Termites can also enter through cracks in slabs. Some hairline cracks are expected in most slabs. However, significant cracks – one-sixteenth inch or wider – will allow entry of termites from the soil or fill material under the slab. Serious problems can occur when cracks form beneath wood or parquet floors.

In structures with sub-slab heating or air conditioning ducts, termites can gain entry where ductwork penetrates the slab. Treating homes with sub-slab ductwork can be very difficult when using a liquid termiticide because of the potential for duct contamination.

Besides the foundation, there are many other building construction elements that termite inspectors must be familiar with, including floor joists, sill plates, sub-flooring, sole or bottom plates, wall studs, top plates, window and door headers, rafters, eaves, soffits, fascia board and thresholds, to name a few.

**Wood with moisture content above 28 to 32 percent is at risk for developing decay fungus.**

Like termites, wood-destroying fungi can attack wood. In fact, wood-destroying fungi destroy more wood yearly than termites. Because there is a relationship between termites and the presence of some wood-destroying fungi, it is essential that the termite inspector be familiar with signs of common wood-destroying fungi. The most common wood-destroying fungus you are likely to encounter is brown rotting fungus, also called cuboidal rot. The name derives from the checkered-pattern look of wood damaged by this fungus. Wood with moisture content above 28 to 32 percent is at risk for developing decay fungus.

Research suggests that termites prefer fungal-decayed wood. Therefore, termite inspectors should be alert for decayed wood in or on any structure they inspect. Some states require pest control operators to inspect for and report wood-destroying fungi during inspections.



Many inspectors perfect their inspection techniques by choice of tools. This technician has wisely chosen a moisture meter to locate moisture behind walls.



A termite inspector looks for evidence of termites where siding obscures the foundation.



An example of termite damage in a home just beneath a normal looking surface.



Example of termite mud tubing partially hidden in a foundation corner.

## INSPECTION TECHNIQUES

Sooner or later, termite inspectors develop their own techniques for performing inspections. Many inspectors begin on the inside of the house, thereby eliminating muddy shoes or clothes soiling a home after inspecting the exterior or crawl space. Some move in a clockwise direction while inspecting, others counterclockwise. The key is to be thorough, do not skip around and adhere to all company and state rules and regulations.

Many states require pest control operators to post stickers or notices at specific locations on structures to indicate when, why and how the house was inspected or treated for termites. Inspectors should look for these notices and also note whether there is visible evidence of a previous treatment, such as vertical or horizontal drill holes in abutting walkways or foundation elements.

Prior to beginning an inspection, draw a diagram of the house. The diagram serves as a map of the structure and provides a graphic way to communicate your inspection findings, such as the location of termites, termite damage and conditions conducive to termite infestation. The diagram should also identify the type of foundation, exterior cladding and roofing, and abutting structures, such as fences, storage sheds or additions. Also include any significant landscape features – large trees or stumps, water wells, swimming pools, or lakes and streams.

**Ask the homeowner to show you suspicious signs or areas where he thinks termites have been active.**

Remember, most termite infestations begin at ground level. Begin your inspection at the lowest part of the structure and pay careful attention to foundation elements, wooden floors, lower walls, door and window frames, and expansion or cold joints in slabs. As you begin your inspection, remember that you are looking for three primary signs: 1) active termites; 2) indications of activity, such as mud tubes, damage, or wings from swarmers; and, 3) infestation-conducive conditions or conditions that may interfere with inspection or treatment.

If you perform an inspection at the request of a homeowner who has termite-infestation suspicions, begin by interviewing the customer. Ask about previous infestations, inspections or treatments. Also ask the homeowner to show you suspicious signs or areas where he thinks termites have been active.

In houses with basements, begin your inspection in the basement. Finished basements will make inspection more difficult. Key areas to check, if they are accessible, include the perimeter of the basement floor where it meets the foundation wall, any stairs, support posts or columns where they rest on the floor, cracks in the foundation walls and



**Wood decay is different from termite damage; however, they can occur together.**



**Wherever wood meets the slab or the ground is a likely entryway for termites. Probing with a screwdriver can help detect hollow wood where termites have tunneled.**



**A technician uses a screwdriver to probe wood for termite evidence.**

under partition walls – especially if the bottom plate or sill is imbedded in the concrete.

At the top of the basement foundation wall you will need to carefully inspect the sill plate, floor joists and header (or rim joists) for signs of termites. Also note any signs of moisture or water intrusion.

Around the exterior perimeter of the basement, closely look for signs of termites where the grade or concrete meets the foundation wall or exterior siding. Pay special attention to the framing around basement windows and below grade doors.

Homes with crawl spaces may or may not have a foundation or stem wall around the exterior perimeter. In either case, the primary means of entry for subterranean termites is to tube over or up through the piers or pillars and the foundation walls. A close and careful examination of all sides of each pier and the entire interior and exterior perimeter of the foundation wall is essential.

Always check the top of every pier, pillar and foundation wall for voids that termites may use to gain hidden access to sills, beams or joists. Also inspect any plumbing lines that go from the soil to the structure. Closely examine the interior of joints and cracks in foundation elements for signs of termite tubes.

Chimney foundations within a crawl space can be a common place for termite entry. Warmth radiated during the colder months may attract termites to this area. Again, there may be hollow spaces in the chimney foundation, especially if it is formed with hollow block or rubble stone.

Earth-filled porches are frequently found attached to both basement and crawl space foundations. These porches have their own foundation and are usually filled with dirt. Their placement next to foundation walls makes inspection difficult and the risk of termite infestation is great. In some locations, it's estimated that earth-filled porches account for more than half of home termite infestations.

While some slab-on-grade foundations can appear easy to inspect, they also can have numerous hidden termite entryways. Ease of exterior perimeter inspections on a slab home is directly related to the height of the grade around the house and whether the exterior siding or cladding extends below grade. Typically, there should be four to six inches between grade and the bottom of exterior siding. Use caution where brick veneer or other siding extends below grade.

Builders often use a thin coat of mortar or parging to waterproof or cover rough concrete or masonry foundation walls. If parging extends below grade, termites can tunnel behind it and infest the house undetected. Lightly tapping on a suspected finish will give a hollow or loose sound if the parging has a gap behind it. Also check the corners of all slabs. This area frequently cracks, allowing termites to enter unseen.



**Termites can enter at plumbing penetrations in the slab.**



**Plants and shrubs can often obstruct a thorough inspection.**



**Whitmire Micro-Gen's Termite Monitoring System offers the tools for a perimeter termite monitoring program. From left to right, PT 701, PT 702, PT 706, PT 707 and PT 709.**



**Advance™ Termite Bait System**

Supported and floating slabs will have joints where the slab meets the foundation wall. Termites can enter through these joints while exterior stud or masonry walls may cover them. Floor and wall coverings and built-in cabinets can also make inspection access to these joints difficult. This type of joint, however, does not occur in true monolithic or single-pour slabs.

The cap or floor of a slab foundation will typically have numerous plumbing or other utility penetrations. They can include water and sewer lines, electrical lines, tub-drain cutouts and vents. In many cases, these areas are completely obscured and access for inspection or treatment will require cutting an inspection port. Failure to do so can result in an undetected infestation.

While inspecting buildings for termites, you should be alert for locations where wood contacts the soil or grade. This is one of the most common conditions conducive to subterranean termite infestation and should always be noted on the inspection report and diagram.

Another common condition conducive to termite activity is moisture accumulation. This can result from plumbing leaks, faulty or missing flashing, constant wetting or roof leaks. In all cases, excessive moisture around, under or in the structure should be reported.

As in all pest management practices, thoroughness during a termite inspection is essential. Do not skip any accessible areas. If you cannot gain access to an area, note it on your inspection report and diagram; then, indicate why the area was not inspected.

Finally, make certain you include all findings on the inspection report and diagram. These are the primary documents that report the details of your inspection. They should be a clear and accurate representation of structure conditions during the inspection.

Whitmire Micro-Gen offers a wide line of termite monitoring systems and the Advance™ Termite Bait System. Together, these products protect homes and structures and give your customers peace of mind, knowing that their homes are constantly monitored and defended against termites. For more information on Whitmire Micro-Gen termite and other products, visit [www.wmmg.com](http://www.wmmg.com) or call 800-777-8570.

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