

CONTROLLING Termites

Subterranean termites are the most widespread and destructive termite group in North America. They are so-named because they excavate through the soil to reach

by Michael F. Potter

wood in contact with the ground. To reach material above ground, they either move through connecting wood, or through earthen “shelter tubes” that they build over concrete, masonry, or other materials. Given the choice, subterranean termites will usually access aboveground wood through protected cracks and cavities, such as in concrete slabs and foundations.

Subterranean termites normally return to the soil periodically for moisture. However, if the moisture content of wood above ground level is high enough, they can survive and multiply indefinitely with no ground contact.

Eliminating conditions favorable to termites is an essential first step in long-term control. This entails

Keep wood dry, use metal shields, and apply a termite treatment during construction



COURTESY DOW ELANCO



Termite Shield

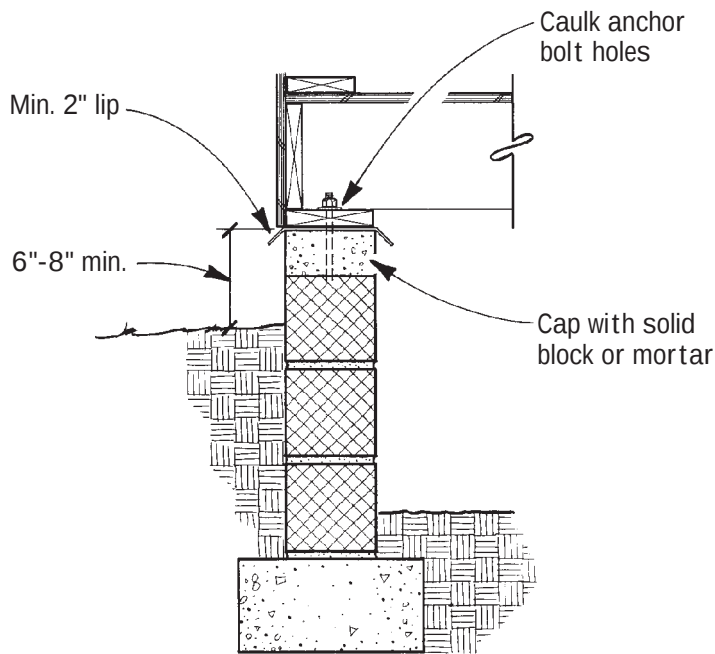


Figure 1. Metal shields force subterranean termites to build their tubes where they can readily be seen, but they don't prevent infestations. To be effective, all joints and penetrations in the shield must be well sealed.

Termiticide Barrier Treatment

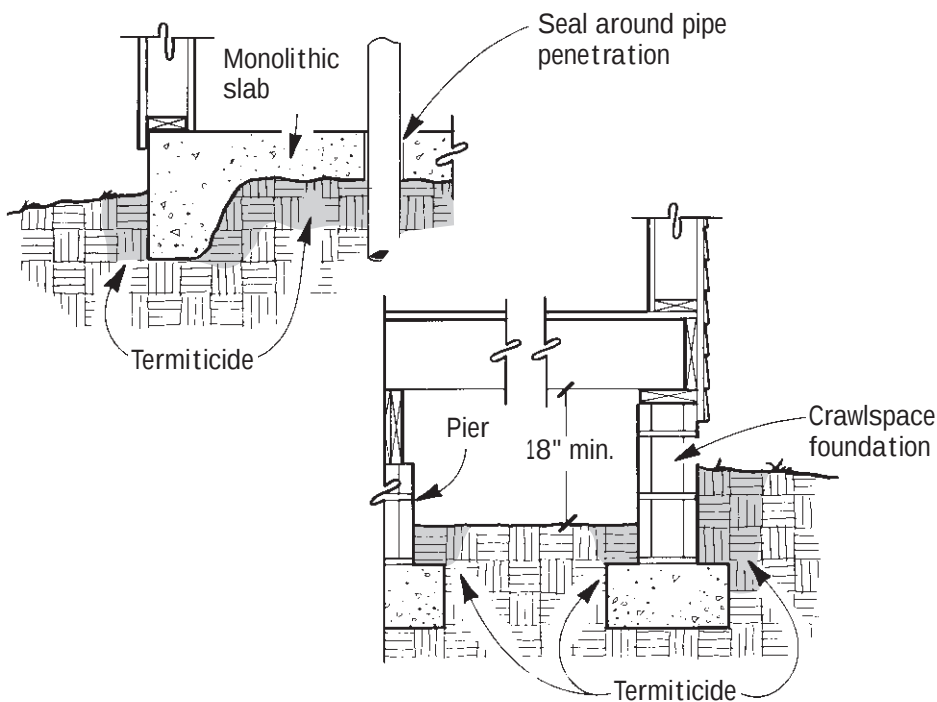


Figure 2. The goal in soil treatment is to establish an unbroken barrier around the structure. Horizontal barriers are created under slabs, garages, patios, driveways, and other slabs abutting the structure. Vertical barriers are required around foundation walls, piers, posts, and so forth, down to the footings.

reducing termites' access to food (wood), moisture, and shelter, which they need for their survival. The best time to address these concerns is during planning and construction (see "Termite-Resistant Details," page 50).

Termite Shields

Metal termite shields are perhaps the oldest type of termite barrier and are widely used in the tropics and the southern U.S. The metal strips are installed on foundations, piers, pipes, and similar avenues of termite entry (see Figure 1). They don't prevent termites from entering, but they can be helpful in detecting infestations. Properly designed, installed, and maintained, shields force subterranean termites to build their tubes around the protruding edge and over the top of the shield where they can readily be seen.

To be effective, the ends of the metal strips must be firmly joined, either by soldering or by an interlocking mechanical joint. Some typical defects found in the shields include:

- Loose joints between metal sections
- Improperly cut and soldered corners where walls intersect
- Anchor bolt holes not sealed
- Insufficient clearance between the outer edge of the shield and adjacent woodwork or piping
- Shields less than 6 inches above grade
- Projecting edges that are bent, torn, corroded, or flattened against foundation
- High-risk areas such as filled porches left unprotected.

Sand Barriers

About 40 years ago, researchers discovered that subterranean termites were unable to tunnel through sand if the particles were too large for termites to move with their mandibles but small enough that termites could not crawl between them — in the range of 2.0 to 2.8 mm for most subterranean termites.

Sand and basaltic rock barriers are now routinely installed on new buildings and utility poles in Hawaii and Australia. Only a handful of U.S. companies outside Hawaii (mainly in California) are currently providing such treatments.

Most of the jobs in California to date have been retrofits in crawlspace homes.

Typically, a 4-inch-thick, 20-inch-wide layer of sand is blown inside the crawlspace along the foundation, and around piers and plumbing entries. Areas outside the foundation, under slabs, and within construction voids are still treated with conventional termiticide. Preliminary field trials have been encouraging, but widespread use may not be practical in the U.S.

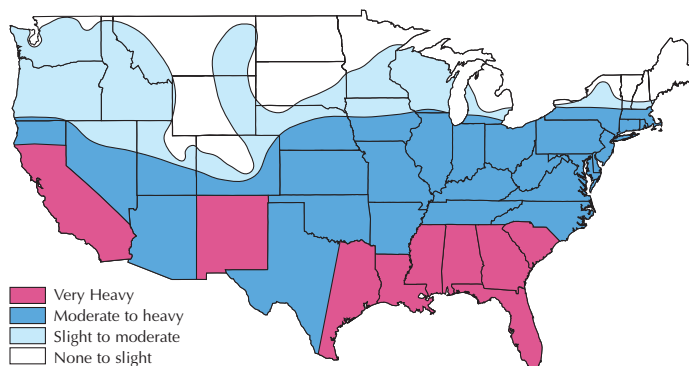
Barrier Treatment with Termiticide

Liquid termiticides have been the mainstay of subterranean termite control for more than 40 years. The goal of this approach is to provide a continuous chemical barrier in the soil surrounding and beneath a structure (Figure 2). Termites attempting to penetrate through treated soil are either killed or repelled.

Continuous coverage requires both horizontal and vertical barriers. Horizontal barriers are created under slabs, garages, patios, sidewalks, and other slabs abutting the structure. Vertical barriers are required around foundation piers, posts, filled porches, and chimneys down to their footings. The termiticide must be of sufficient concentration, applied at the proper rate (gallonage), and strategically placed to block all potential entry routes.

Comprehensive instructions for treating different types of construction can be

Potential for Subterranean Termite Infestation



Subterranean termites, which cause an estimated \$1 billion of damage annually to U.S. homes, are found from New England to Florida in the East and from Washington to the Gulf of Mexico in the West.

found in the *Approved Reference Procedures for Subterranean Termite Control* (National Pest Control Assoc., 8100 Oak St., Dunn Loring, VA 22027; 703/573-8330) and by referring to the directions on termiticide labels.

Pretreatment vs. Retrofit

The most effective and economical time to apply a soil treatment is during construction—when termiticide can be precisely placed where it is needed below slabs, around pipes and utility conduits, and along all sides of foundations and piers. A subsequent treatment along the foundation is needed

after the final backfilling and grading.

Postconstruction treatment is complicated by many factors, including poor soil absorption, inaccessible areas, and a general inability to see where the termiticide is flowing. Many of the potential termite entry points are hidden behind walls, floor coverings, tubs, and other obstructions. The risk of puncturing and contaminating ducts, drains, and wells also increases with postconstruction applications. Because of all these factors, many more untreated gaps occur in the soil barriers—increasing the likelihood and need for retreatment.



Figure 3. The new baiting systems coming on the market use slow-acting toxicants, which spread among termites by feeding and grooming. The Sentricon system, shown above, uses plastic monitoring stations inserted in the soil (right) — first with wood to lure termites, then with toxicant-laced baits formulated to eliminate entire colonies.



LOWE/ELANCO

Termite-Resistant Details

Although there is currently no method to make a building “termiteproof,” there are ways to make structures less vulnerable to termite attack.

Wood-to-ground contact. It has been estimated that 90% of structural ter-

mite infestations are the result of wood coming into contact with the ground. Keep wood siding, latticework, door frames, and trim at least 6 inches above grade; 18 inches for horizontal structural members (24-30 inches in humid

areas). Wood posts, stair carriages, etc., should never penetrate concrete floors. Set outdoor wood porches and steps on a concrete base at least 6 inches above grade (Figure A).

Where wood-to-soil contact cannot be eliminated, use preservative-treated wood. However, be aware that termites can still enter the wood through cut ends and cracks and may also build tunnels over the surface.

Debris and vegetation. Remove cellulose materials such as stumps, scrap wood, form boards, and grade stakes from under and around the building. Keep firewood and compost piles, as well as dense vegetation, away from the foundation. Decorative wood chips and mulch should never contact wood siding or trim.

Moisture-related conditions. Termites are more likely to infest a structure if wood or surrounding soil is consistently moist. Slope finish grade, walkways, patios, etc., away from the building, and install and maintain gutters, downspouts, and splash blocks.

Moist crawlspaces also promote termite problems. To reduce humidity lev-

Wood-to-Soil Clearances

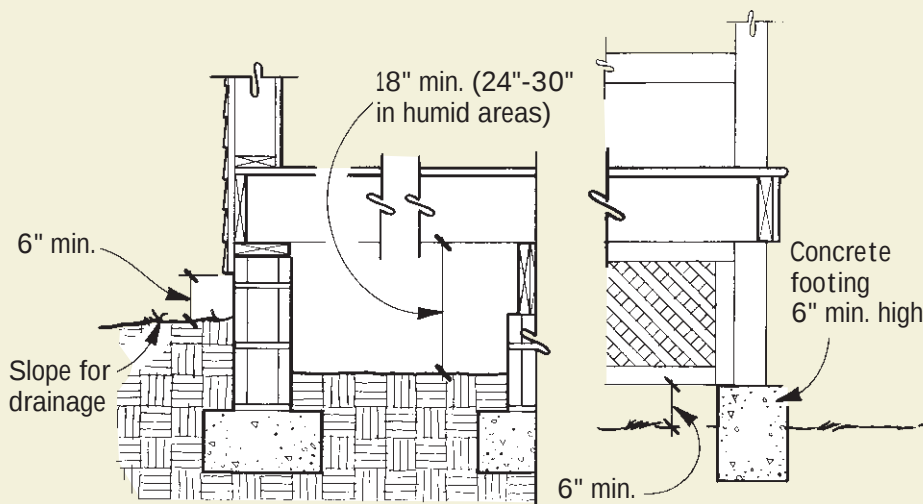


Figure A. Keep wood siding, latticework, door frames, and trim at least 6 inches above grade; 18 inches for horizontal structural members (24 to 30 inches in humid areas). Wood posts, stair carriages, etc., should never penetrate concrete floors. Set outdoor wood porches and steps on a concrete base at least 6 inches above grade.

Concrete Slabs

Concrete slabs present a number of challenges for treatment and have produced the greatest number of retreatments and damage-related claims for the industry. Termites enter slab-on-ground buildings through expansion joints, settlement cracks, posts, forms and grade stakes embedded in the slab, and around utility penetrations. Many of the interior entry points are hidden by floor coverings and other obstructions. Termites can also gain hidden entry by tunneling up the foundation under stucco, brick veneer, or wood siding at or below ground level.

Slab-related termite problems would rank even higher if “attached slabs” such as porches, stoops, garages, and additions

were included in this assessment. Filled porches (raised slabs) are an especially common source of termite problems and a challenge to treat. Form boards, scrap lumber, paper, and other construction debris are often discarded here before the slab is poured. Besides being an attraction to termites, the hidden debris can obstruct the flow of termiticide.

The New Termiticides

For more than 40 years, the standard method of controlling subterranean termites has been a soil barrier treatment—Chlordane and Heptachlor were the dominant products for years until they were withdrawn from the market in 1987. USDA tests showed these compounds to last for more than 35 years in

the soil. This characteristic made them very effective but was viewed negatively by environmental groups and regulatory agencies. Furthermore, the chemicals had been labeled possible carcinogens (based on lab experiments with mice) and often left detectable odors in houses that persisted for years.

The current generation of termiticide products are more expensive, shorter lived, and perceived by many to be less reliable than their predecessors. At the moment, nine products are being marketed for soil barrier treatments around and beneath structures. Six of these products are different types of synthetic pyrethroids, two are organophosphates, and the last and most recent (imidacloprid) is from a new chemical class called

Raised Slabs

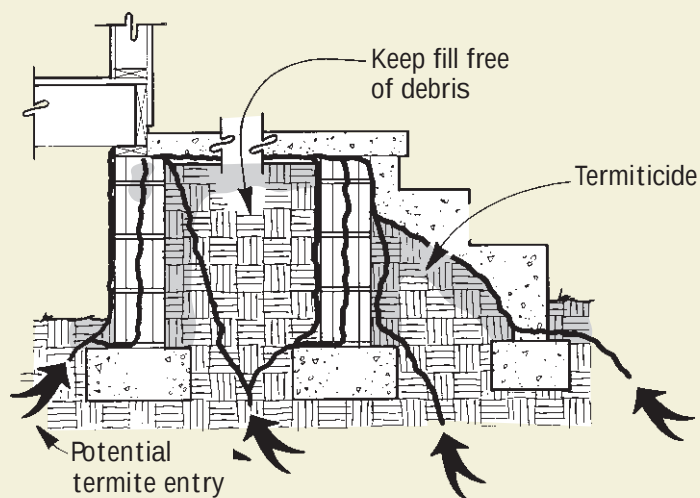


Figure B. Termites frequently enter buildings where porches, steps, or other raised slabs are attached. If such details can't be avoided, make sure all fill is free of debris and that soil and foundation voids are pretreated with termiticide.

Stucco/Brick Below Grade

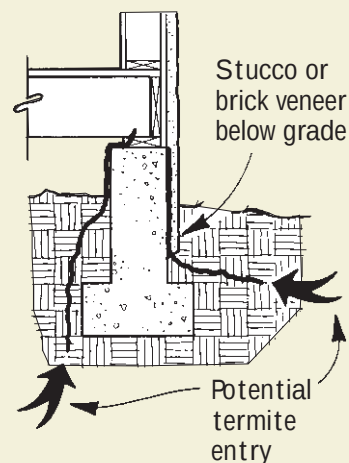


Figure C. Stucco or brick extending below grade is another common source of hidden termite entry.

els, cover the exposed soil with polyethylene or heavy roofing paper and install adequate foundation vents.

Problem building details. Certain construction details are conducive to termites. Dirt-filled porches, steps, patios, and similar raised attachments are responsible for a large percentage of termite infestations (Figure B).

Stucco extending below grade is

another common source of hidden termite entry into buildings, especially in the South (Figure C). When stucco separates from the foundation wall, termites can tunnel upward undetected.

Foam insulation. When foam board insulation is installed below grade, termites may tunnel undetected through or behind it into the structure. The foam is of no nutri-

tional value to termites, but apparently offers ideal nesting and tunneling conditions. Liquid termiticide cannot be applied remedially because the foam panels resist wetting. In light of these difficulties, many pest control companies refuse to treat structures with foam insulation, or provide no guarantee for their work.

— M.P.

the chloronicotinylns. Other new products are undergoing tests throughout the country.

Some of the new products have lower acute toxicity to mammals than others, or are less likely to irritate the skin of applicators. Most have extremely low vapor pressures, resulting in virtually no indoor odors. All can be normally cleansed from surfaces with detergent and water. Because these products are relatively insoluble in water, they can be expected to remain largely in place in the soil following application. Although the new chemicals pose no known significant hazard to humans or pets, many are toxic to fish, necessitating extra care when treating structures adjacent to water.

Despite the handling and safety benefits, adjusting to the post-Chlordane termiticides has been a trying experience for many pest control companies. In comparison to Chlordane, the current products are more expensive to apply, yet less persistent in the soil. USDA studies suggest that these products should control termites for at least five years if they are applied at label concentrations. The actual length of control will depend on such factors as thoroughness of application, foraging intensity, and conducive conditions. Moreover, soil and climatic factors appear to have a much greater influence on the longevity of these products. What works well in one area may prove to be an inferior product in another.

Application techniques. With any of the current chemicals, a continuous barrier is the key to long-term control. Once a group of foraging termites finds a gap of untreated soil and tunnels upward into the structure, other nest mates will follow their scented trail. One way to reduce untreated gaps is to use as many gallons of termiticide as the label and soil will allow. In one New England survey, researchers found that houses treated with more than 200 gallons required far fewer retreatments than those that received less than 100 gallons. It is also important that the current termiticides be applied at their full labeled concentrations. Of course, high gallonage and concentrations are of little value if critical entry areas for ter-

mites are missed.

Use of foams. The most difficult area to accurately place termiticide is under slabs. Liquid dilutions tend to disperse randomly under slabs, resulting in inconsistent coverage.

One approach is to apply the termiticide as foam, which serves as a carrier to disperse termiticide laterally in the space that often exists between the bottom of the slab and the fill. Foam has proved useful in stopping termites from tunneling along the underside of slabs, within voids of concrete block or stone foundations, and behind brick veneer.

While it is not a panacea, foam can help deliver termiticide to hard-to-reach areas and has proved very effective in retreating chronically infected structures.

Wood Treatments

Wood can be treated for termites either as a preventive measure or to eliminate existing infestations. The best approach, where feasible, is to use preservative-treated lumber. Most termiticides used for soil treatment can also be applied to wood either by spraying, brushing, or injecting into voids and galleries of infested wood.

Products containing borates have certain advantages (see "Controlling Termites and Carpenter Ants with Borates," 2/97). They are toxic to many species of wood-destroying insects and fungi, and unless exposed to constant rewetting, maintain their preservative qualities for decades. In addition, they are nonstaining, odorless, and low in toxicity to mammals (about the same as table salt), making them especially attractive for remedial treatment of wood inside homes.

Research and practical experience suggest that borate-treated wood is protected from subterranean termite attack, provided sufficient boron concentrations are achieved in areas where termites are feeding.

Termite Baits

Regardless of the amount of termiticide used, barrier treatments do little to reduce colonies in the surrounding soil. Termite baits are a whole different con-

cept. With baits, minuscule amounts of material are deployed like edible "smart missiles" to knock out groups of foraging termites. An aggressive baiting program seeks to achieve a termite-free zone around the structure through ongoing monitoring and rebaiting as needed.

Baits are being developed for both exterior and interior use, both below and above ground. Some may be used as comprehensive, stand-alone treatments. Others will be better suited for spot treatments of active infestations. While debates exist over which compounds and strategies are most effective, a variety of systems are now coming on the market. By the end of the decade, there could be almost as many termite baits as conventional termiticides.

Below-ground baits work by luring termites to feed on wooden stakes or other cellulose materials placed around the structure and/or around woodpiles, stumps, moist areas, and adjacent to damage. Since termites cannot see or smell the bait, getting termites to find it requires planning and persistence, and can be a lengthy process.

One commercial system, called Sentricon (DowElanco, 9330 Zionsville Rd., Bldg. 308, Indianapolis, IN 46268;

800/352-6776), uses a three-step process involving initial monitoring, delivery of the bait, and subsequent monitoring at three- to four-month intervals to guard against reinfestation (Figure 3, page 49). A portable computer and bar-code scanner are used to input data at the job site. Researchers have confirmed the effectiveness of this type of system but emphasize the importance of continued monitoring.

Baits are especially useful in chronic retreatment situations and where contamination is a risk. Difficult construction features such as wells, plenums, sub-slab heating ducts, inaccessible crawlspaces, rigid foam insulation, stucco below grade, and rubble foundations, can all be treated with baits. As versatile as baits can be, however, they will not work by simply hammering a few into the ground and walking away. Success requires a thoughtful approach with diligent monitoring by crews knowledgeable about termite biology.



Dr. Michael F. Potter is an urban extension entomologist at the University of Kentucky College of Agriculture in Lexington, Ky. This article was adapted from *The Handbook of Pest Control*, published by G.I.E. Publishing, Inc., of Cleveland, Ohio.

Sources of Supply

The following listing provides sources of borate products EPA-labeled for beetles, carpenter ants, and termites. To obtain Bora-Care and Tim-bor, the two major products, call the manufacturer's 800 number to find a local distributor.

Nisus Corporation

215 Dunavant Dr.
Rockford, TN 37853
800/264-0870
*Bora-Care, Niban Granular Bait,
Jecta Diffusible Boracide*

Perma-Chink Systems, Inc.

1605 Prosser Rd.
Knoxville, TN 37914
800/548-3554
Shellguard Guardian

Sashco

10300 E. 107th Place
Brighton, CO 80601
800/767-5656
Penetreat Impel Rods

U.S. Borax

26877 Tourney Rd.
Valencia, CA 91355
800/984-6267
Tim-bor Insecticide

NOTE: Two unlabeled products, chemically identical to Tim-bor Insecticide but less costly, are Solubor, a fertilizer-grade borate available from agricultural supply centers and Tim-bor DPT, available from Sashco. With either, follow label directions for Tim-bor Insecticide. Another option is mixing 1.2 parts borax and 1 part boric acid, yielding a similar compound.