

**WHITE PAPER**

**TERMGUARD USA'S  
TERMITE MANAGEMENT SYSTEM**

**BRIAN FORSCHLER, PH.D.  
ENTOMOLOGIST  
THE UNIVERSITY OF GEORGIA  
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## **INTRODUCTION**

Termguard USA, Inc. (Termguard) requested me to perform a review of selected informational materials and engineering reports and provide my professional opinion of their product, the Termguard Termite Management System. Termguard systems were developed, tested and are extensively used in Australia where there are over 300 species of termites. Australian termite-related building codes and termite management standards are stringent, making it an ideal proving ground for advanced termite control technologies. Termguard's reticulation systems have been shown to meet or exceed the requirements for safe, long-term termite protection in Australia. My review of Termguard's test and engineering data indicates that these proven systems may be equally effective and beneficial when utilized in the U.S.

## **TRADITIONAL SOIL TREATMENT FOR SUBTERRANEAN TERMITES IN THE UNITED STATES**

Subterranean termites are responsible for 1-2 billion dollars in annual control and damage repair costs in the United States. The efficacy of a properly placed soil termiticide barrier in protecting structures from subterranean termite infestation has been demonstrated over the past fifty years. The ability of a soil termiticide barrier to protect wooden building materials is dependent on many variables including: the active ingredient, soil type, construction practices, the correct placement of formulation in 'critical' areas, and longevity of the formulation.

Long-term termite protection methods require both initial and periodic re-application of the termiticide barrier to maintain a termite-free structure. The termiticides currently registered in the U.S. must persist for five years in various soil types as tested by the U.S. Forest Service. **Pre-treatment of slab construction** using the termiticide barrier concept is fraught with difficulties, that include 1) potential disruption of the intended barrier and 2) pesticide exposure to construction workers. **Post-construction termiticide treatment** is labor intensive because it generally entails placing termiticide in the soil **surrounding** construction elements that afford subterranean termites access to wooden components from the soil. This means that workers must excavate soil around exposed foundation elements and drill slab foundations along cold joints, expansion joints and utility penetrations.

## **RETICULATION SYSTEMS: A BETTER ALTERNATIVE**

Pesticide use in the urban environment has long been an area of concern to citizens and government agencies, and termite control practices are no exception. **The concept of a reticulation system to deliver termiticides only to critical areas of construction has**

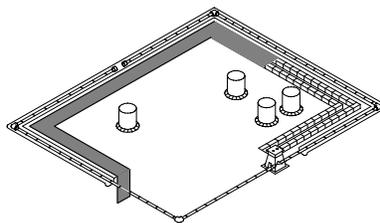
**merit.** A reticulation system – once in place – **can deliver termiticide solution without the digging and drilling** that accompanies traditional soil termiticide treatments and alleviates pre-construction exposure potential. It is **cost-effective** from the standpoint of labor, environmentally friendly in **reducing risk of pesticide exposure to non-targets**, and efficacious in **delivery of termiticide to only those areas required to maintain an effective barrier.**

## **THE TERMGUARD RETICULATION SYSTEMS**

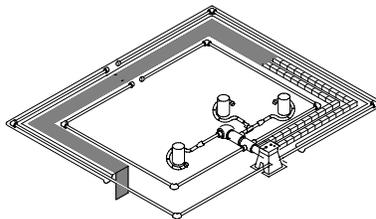
Termguard offers several reticulation systems to meet the varied demands of construction methods and foundations common to the production home building market. Termguard systems have been extensively tested over the past twenty years and have proven capable of delivering termiticide to critical areas of construction as a proven alternative to the invasive, destructive, labor intensive re-charging of established termiticide soil barriers and the application of initial treatment.

All Termguard's systems are more environmentally friendly, reduce labor costs and provide efficient delivery of termiticide. The three basic systems below address the range of termite protection needs:

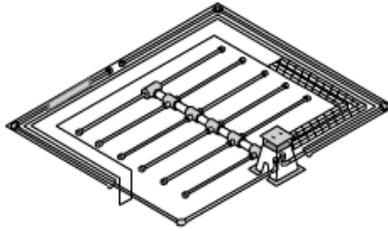
- **Perimeter Retreatment and Armored Shield System** that provides the reticulation system as protection around the monolithic slab's exterior and interior perimeter with a physical barrier at the site of all utility penetrations.



- **Perimeter and Penetration Retreatment System** that provides a reticulation system around the exterior and interior perimeter and to all slab penetrations.



- **Ultimate System** that provides a reticulation system for protection of exterior and interior perimeters along with full coverage under the slab.

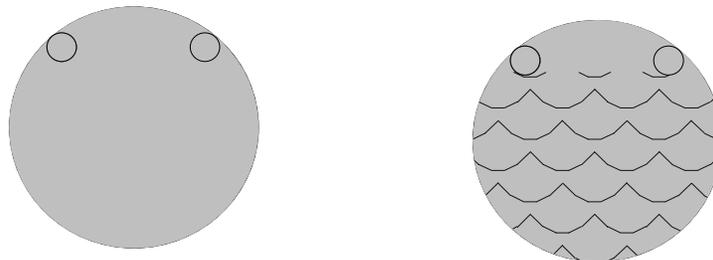


Termguard systems go beyond just providing reticulation technology, but are a full termite control solution. Termguard's objectives are to:

- Deliver termiticide to critical areas of construction using a system that directs quantifiable amounts of termite control products to areas of construction vulnerable to termite infestation.
- Provide training and certification of applicators to maintain the highest standard of quality assurance.
- Continue a commitment to improve the system through an aggressive research and development program.

### **HOW THE TERMGUARD SYSTEMS WORK**

The Termguard system is unique in its design and enables an equal distribution of solution within a 15% variation. The design of the pipe and the placement of the holes in the pipes create a reservoir that enables the whole system to fill prior to any solution dispersing from the holes. The diagrams below show the placement of the holes in a cross section view.



The holes are placed in the top 20% of the pipe and are installed facing upwards. This enables the system pipe to fill to 80% before beginning to emit any solution. This is also how the Termguard system delivers such an equal distribution of solution. A solution pumped through a perforated pipe will follow the path of least resistance. Therefore, in a simple reticulation system of perforated pipes, the pressure at the first hole along a pipe will be higher and

therefore more solution will flow through the first hole compared to the last hole along the same system. This presents problems for delivering equal amounts of solution. Termguard has solved this problem by adding a manifold that equilibrates the pressure at all the holes in the system to deliver equal amounts of solution from the first through the last holes.

The system has been tested to find the best pump head pressure, hole placement and spacing and length of perforated pipe for equitable distribution of termiticide solution to all sections of the system and achieve label application rates. Pump pressure of 2-3 psi through no more than 65 feet of 3/4-inch diameter pipe perforated with two 0.08-inch diameter holes placed on 8-inch centers will deliver approximately 22 gallons of solution per minute per 8-inch of pipe with less than 15% variation in the flow rate per hole along the entire length of the system.

The flow rate in the Termguard systems is dependent on keeping the holes in the perforated pipe free from obstructions, especially construction fill. This problem has been solved by the use of the Permecover – a GeoFabric non-woven mat that keeps the construction fill from blocking the perforated pipe. In addition, the Permecover contains the termiticide within those areas of construction that require a termiticide barrier. The use of unwashed sand/soil with the specifications of 95-100% passing a ¼-inch and 0-10% passing a 3-inch mesh sieve provides for equitable movement of the delivered termiticide solution to the appropriate areas of construction.

Termguard systems have considered all of the appropriate engineering questions that would limit the application of a continuous and uniform termiticide barrier. **In fact, effective delivery of a termiticide barrier is more likely using the Termguard systems than by using typical application methods and conventional equipment.**

#### **ENGINEERING REPORTS AND TEST FINDINGS**

The Termguard systems have been thoroughly tested and have met the stringent requirements of the Australian Building Codes National Certificate of Conformity since 1997. **Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO)**, one of the world's largest and most diverse scientific research institutions, annually assesses all Termguard systems, and has determined that the Termguard systems exceed the requirements of the Australian Standards for Termite Management, including the business requirements for inspection reports and record-keeping methods of licensed installers. Their appraisals examined the systems' use of appropriate materials in construction designed to last

at least 50 years and the delivery of solution to areas appropriate for consistent termite control.

The research conducted on Termguard systems to date includes the following:

- **Chrysalis Scientifics' Mr. Mathew Lawther, Entomologist**, provided an assessment on the effectiveness of Termguard system in forming a termite barrier. His opinion was that the system gives an equivalent or better barrier than that obtainable by traditional hand spraying.
- Engineering reports by **Lindsay D. Ames of CRW Engineers between 1995-98**, state that the impact of the appropriate volume of liquid when applied through Termguard systems would not effect the structural performance or integrity of slab construction on stable or highly reactive soil types. **Robert W. James, Consulting Engineer**, conducted a computer simulation of Termguard systems delivering solution that determined the optimal hole spacing and placement design that is currently used in the Termguard system. In addition, in 1998 James' validated the fitness of the non-return valve used in Termguard systems with the appropriate delivery systems – pump, pipes and solutions.
- **Dr. Roger Franklin** assessed the systems' performance using the termiticides Bifenthrin and Chlorpyrifos and their bonding ability with the soil. It was his opinion that the termiticides would affectively bind to the target areas and not leach from the desired areas of treatment even if subsequent wetting occurred.
- **Amdel Limited (NATA Certified) in conjunction with Australian Analytical Laboratories** evaluated the systems' ability to deliver a chemical barrier in accordance with the Australian Standard termite management requirements. Their findings concluded that Termguard systems satisfactorily delivered the correct concentration and distributed the chemical complying with the Australian Standards AS3660.1.
- Separate small-scale simulation tests conducted by **Kerryn McDougall and Robert W. James** in 1997 documented the efficacy of Termguard systems in delivering more than adequate concentrations of the termiticides Chlorpyrifos and Bifenthrin to bath trap and footings, respectively.
- **The National Registry Authority** in Australia reviewed the use of Biflex through Certified Reticulation systems and found the Termguard systems met the requirements for delivery of the termiticide for both pre- and post- construction.
- The **CSIRO building products and systems Appraisal 198** conducted in 1995 was the first to ascertain conformity of Termguard systems to Australian Building code requirements. Appraisal 212 was issued the following year and amended several times while Appraisals 230 and 263 addressed the Armored Shields System and sub-cavity

systems. These appraisals confirmed the use of appropriate materials in construction designed to last at least 50 years and the delivery of solution to areas appropriate for consistent termite control. The appraisals list the specifications as outlined in the Termguard Technical Manual as sufficient for the intended purpose. Since 1999, the CSIRO Appraisals have provided for the Certificate of Conformity awarded to Termguard systems by the Australian Building Products and Systems Certificate Scheme for compliance with the Building Code of Australia. There are currently two termiticides registered for use in reticulated systems – Biflex by FMC and Premise by Bayer.

## **CONCLUSION**

The Termguard reticulation systems offer efficient, directed placement of easily quantified amounts of termiticide to specific elements of construction that are inaccessible following completion of construction. The systems avoid the problems typically associated with pesticide drift and they minimize risks associated with pesticide exposure. They also can alleviate disruptive barrier renewal treatments and, in pre-construction, eliminate exposure or barrier disruption by concrete workers. The systems have been extensively tested and successfully used over the past two decades. It is my opinion that Termguard reticulation systems should be approved in the U.S. for environmentally friendly and efficient delivery of termiticide to specific areas of construction that results in long-term termite control and damage prevention.

## **LIST OF DATA PROVIDED AND EXAMINED**

### **1. Engineering Reports**

- a. Robert W. James, Consulting Engineer, 29 June 1996 - Termguard Delivery System Under Slab System extended to large slabs (9 pages)
- b. Robert W. James, Consulting Engineer, 11 February 1996 - Termguard Delivery System Peripheral Pathway system with Manifold (15 pages)
- c. Robert W. James, Consulting Engineer, 17 April, 1997 - Biflex Termiticide and the
- d. Termguard Re-treatment system (7 pages)
- e. Robert W. James, Consulting Engineer, 16 April, 1998 - Termguard Ultimate Underslab and Perimeter System – Non Return Valve (2 pages)
- f. Dr. Roger W. Franklin, Report 28 November 1997 (8 pages)
- g. NSW Agriculture Laboratory Services, May 1997 (9 pages)
- h. Amdel Limited and Australian Analytical Laboratories, 6 June 1994 (10 pages)
- i. Chrysalis Scientific, Mathew Lawther, Entomologist, 16 July 1998 (2 pages)

2. **About Termguard** – A Systems Overview (20 pages)
3. **Termguard Technical Manual** (44 pages)
4. **Certificates of Conformity** (5 pages)
5. **CSIRO Appraisals** (35 pages)
6. **Prospective Licensees Information Package** (14 pages)
7. **Australian Termiticide Labels** (14 pages)
8. **Reference Links**
  - a. Australian Building Codes Board – <http://www.abcb.gov.au/>
  - b. Australian Environmental Pest Managers Association – <http://www.aepma.com.au/>
  - c. Association of Structural Pest Control Regulatory Officials – <http://www.aspcro.org/>
  - d. CSIRO Australia – Scientific and Industrial Research – <http://www.csiro.au/>
  - e. National Pest Management Association – <http://www.pestworld.org/>
  - f. Termguard Termite Management Systems – <http://www.termguard.com.au/>
  - g. Termites of Australia – <http://www.utoronto.ca/forest/termite/aus-dist.htm> - australia
  - h. Termite Damage in the USA – [http://www.pestworld.org/media/art\\_big\\_bite.asp](http://www.pestworld.org/media/art_big_bite.asp)

#### **About Brian Forschler, Ph.D.**

I am currently tenured as Associate Professor of Entomology at The University of Georgia in Athens, Georgia. My academic and research activities have included twelve years of work on subterranean termite biology and control. I have published over 50 scientific articles on termites, examining questions as diverse as species determination, to gene flow within and between populations, to efficacy of control technologies. I have given over 200 presentations on termites for industry training as well as at scientific society meetings and currently serve on a UNEP/FAO workgroup on termites providing recommendations for the Persistent Organic Pesticides (POP's) treaty negotiations and on the termiticide label review committee for the Association of State Pest Control Regulatory Officials (ASPCRO).