Bugs & Buildings

Termite and Moisture Control
Vs
New Construction Trends

Agenda

Subterranean Termite Control History/Facts

Sub. Termites and Moisture Relationship

Issues of the 1990's

Moisture Survey and Results/Case Studies

Customer Communication

Industry Trends

Conclusions – Working Together

Bert Snyder

Palmetto Exterminators

- Vice President
- Training and Technical Operations

Graduate Entomologist from Clemson U.

Over 28 Years of Experience

Past President of GCPCA and SCPCA

- Residential Termite and Pest Control Company
- Family Owned Since 1960
- 8 Locations Throughout SC
- Also Operate in Savannah, GA and Charlotte, NC
- Approximately 50,000 Customers
- 59th largest in USA, 17th largest in Southeast

Who are You?

Structural Engineers

Mold Remediators

Moisture Control Specialist

Closed Crawlspaces

HVAC Specialist

Licensed Contractors

Architects

Lawyers

Subterranean Termite Control History/Facts

- Sub. Termites cause more than **$5 Billion** in Damage per Year on Average!
- Annually this is more than Storms and Fires
- **1987** we lost Chlordane
- **1990**'s infestations were increasing rapidly
- **1995** Bait Systems were developed.
- **Late 90**'s non repellents termiticides became available
- **2000** Wood Treatments labeled for New Construction

Subterranean Termite Biology 101

- Social Insects
- Caste System: Workers, Soldiers, Reproductives
- Workers do all of the damage
- Primary Queens can lay 2000 eggs per day
- Every year healthy colonies produce Swarmers
- 18 to 20 Colonies per Acre **(DNA mapping)**
- Can forage 200 to 300 feet looking for food
- Their primary source of moisture is from the ground

Formosan Subterranean Termites

Fact vs. Fiction

- They are not a super termite and cannot eat thru concrete.
- Are one of 4 species of Subterranean Termites in SC.
- Formosans are Arboreal – will infest live trees
  (17 different sp.). Love live oaks and water oaks.
- Colonies can grow to 5,000,000+ insects in size
- Are a very aggressive and resilient species.
- Create Carton Nests above ground in trees and homes.
- The inspection and treatment is the same for all species.
- Although rare, they do have the ability to infest a structure by flying in when an adequate moisture condition exists.

Sub. Termites and Moisture Relationship

- Must have moisture to survive.
- Above ground moisture sources increases Sub Termites success. Termites do not need to travel back to the soil as much if at all.
- Active Wood Destroying Fungi produces by-products that attracts termites.
- Termites will follow the the moisture gradient.
- Active Fungi increases termite activity/tubing.
- Bulk moisture will disturb soil in treated areas.

The 1990's

- The Problems in 1990's caused us to Reevaluate our positions on Termite Control
  - Increased infestations
  - Increased Damage Claims
  - Increased Litigation
  - New products for that time not very effective
  - Increase retreatments
  - Increased Costs but lower prices
  - Builder Apathy

We had a Decision to Make!

1. Were we going to **change** or Business Model and **move away** from Termite Control?
2. Were we going to **maintain** our current Business Model and **become proactive** to change the current Trends?

We Chose Number 2!

How to change the Trends?

- We knew from experience that most of our claims were **associated with moisture problems.**
- How big of a problem was moisture**?**
- Moisture Survey of our customer base should give us the answer.

Survey Results

Annual Inspections - Percentage of customers with some form of moisture problem that needed the Homeowner's attention.

- Coastal Region (Charleston) 65%
- Midlands (Columbia) 50%
- Upstate (Greenville) 45%

Types of Problems

- Plumbing leaks
- **Condensation on Ducts**
- **Condensation throughout the crawlspace**
- **Hanging or fallen insulation**
- Damp soil - no vapor barrier
- Poor ventilation
- No ventilation
- Dead air spaces
- Condensation drain lines in the crawlspace
- Crawlspace soil below grade
- Poor foundation drainage
- No gutters
- Active wood destroying fungi
- High wood moisture content
- Dryer vents in the crawlspace
- No or little insulation on ducts
- Leaking or broken ducts
- Construction defects
- **Cracking or peeling paint**
- **Old or no caulking**
- **Exterior wood destroying fungi**
- Stucco

Surface Mold and Mildew

- Surface Mold and Mildew is typically found in every crawlspace in the Southeast
- Unless it is very heavy or the wood moisture content is 20 % or greater we do not consider the presence of typical surface mold and mildew a problem.
- Wood Destroying Fungi becomes active when the Wood Moisture Content hits 28%

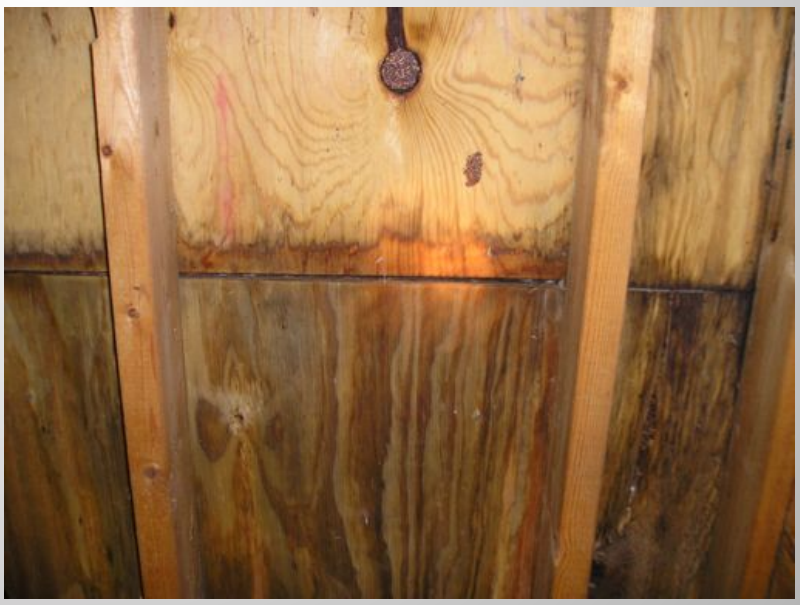
Case #1

- Stucco
- Walk Under
- 20 years old
- $900,000+

Case #1

Case #1

Case #1



Case #1

Case #1

Case #2

- Crawlspace
- 15 years old
- $500,000

Case #2

Case #2

Case #3

- Crawlspace
- 35 years old
- $800,000

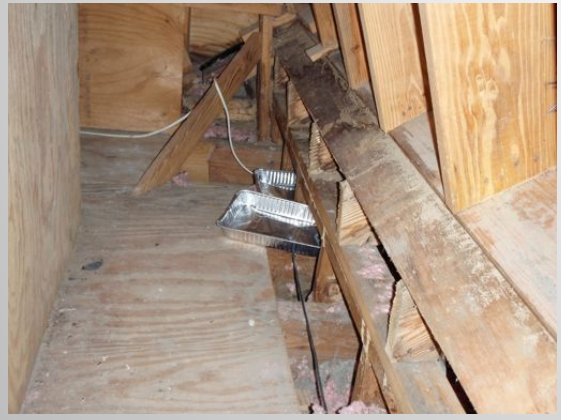
Case #3

Case #4

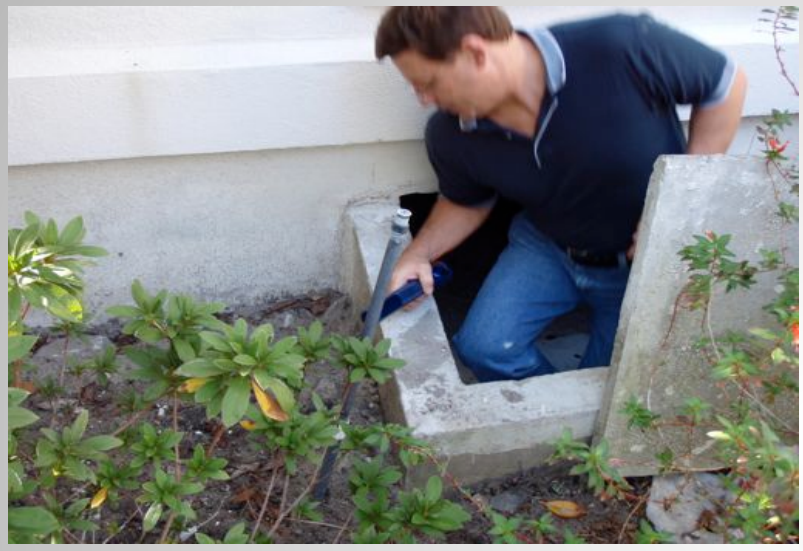
- Crawlspace
- Stucco
- 40 years Old
- $1,500,000+

Case #4

Case #4



Case #4



Case #4

Case #4

Case #4

Case #5

- Crawlspace
- 16 years old
- $450,000

Case #5

Case #5

Case #5

Case #5

Customer Communication

- Customer Education is the biggest Challenge.
  - Most Homeowners do not understand the complexity of moisture issues.
  - Homeowners are being told contradictory information from so called Moisture Control “Experts/Professionals”
  - Homeowners do not know **who to believe**.

Customer Education #1

- **Interior Temperature:** The lower the interior temperature, the more likely that a crawl space moisture problem will exist. The floor framing of a home that is maintained very cool will often be below the dew point of the air in the crawl space and condensation will occur on those surfaces. When this occurs for long periods of time, staining and decay can develop in the wood. This condition can also saturate floor insulation. My experience is that homes maintained above **75 F** have fewer problems.

Customer Education #2

- **Ground Covering Vapor Retarder:** The solum (dirt floor in a crawl space) releases moisture vapor to the crawl space as a result of evaporation. Studies have shown that the average crawl space in the United States receives approximately 12 gallons/1000 square feet/day of moisture by soil evaporation. That number can increase to around 19 gal/1KSF/day when the soil is very wet. A 6 mil polyethylene vapor retarder, well lapped and staked to the soil can inhibit much of the soil evaporation and reduce the moisture load on the crawl space.

Customer Education #3

- **Crawl Space Vents:** Contrary to what many people think, venting a crawl space in the summer does not usually reduce crawl space moisture. I have found that the absolute humidity or humidity ratio of the air outside a crawl space is often higher than that of the air in the crawl space. Consequently, venting to the exterior will increase the moisture load on the crawl space. The installation of crawl space vent fans can exacerbate the problem by injecting large quantities of humid outside air into the crawl space.

Customer Education #4

- **Ground and Surface Water:** Liquid water can enter a crawl space through the foundation or by seeping through the soil. It is imperative that water be kept away from the perimeter of the home. The grade around the home should be sloped away to promote drainage. Installing gutters with leaders that transport water well away from the foundation is beneficial. Homes with irrigation systems are particularly sensitive to ground water. The irrigation timer should be programmed such that the ground does not become excessively wet.

Customer Education #5

- **HVAC Ducts in a Crawl Space:** By their very nature, HVAC ducts are cool during the summer. It is important that the ducts be well sealed and insulated. There should be no gaps or tears in the insulation. There should not be excessive air leakage from the ducts into the insulation layer. Both of these conditions will result in condensation. The duct insulation should be installed at the appropriate thickness. When the insulation is wrapped too tightly, the insulation value decreases. An awl or ice pick can be used to check duct insulation thickness. If possible, the ducts should be insulated with R-values higher than the code minimum of R-6.

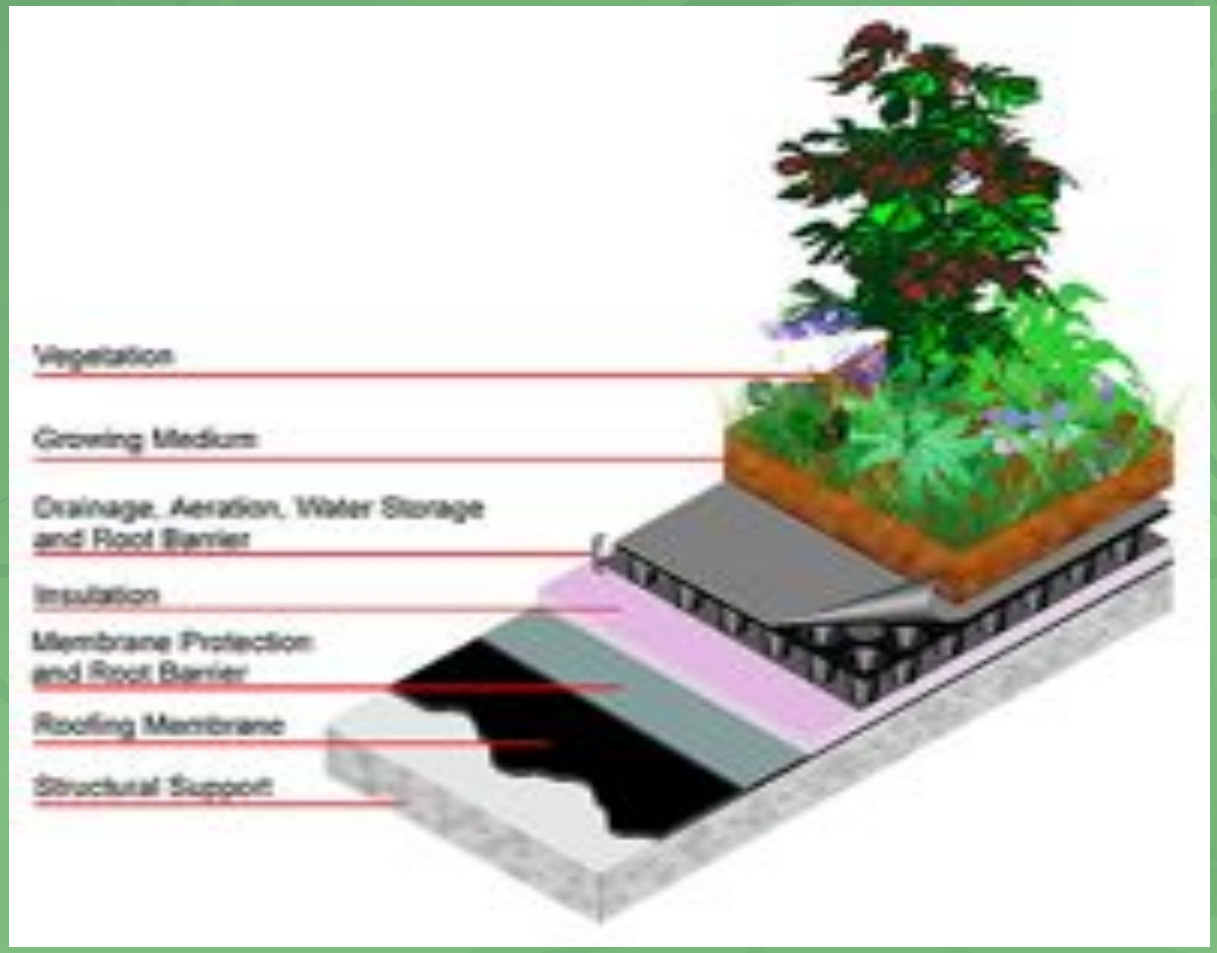
Industry Trends

- Green and Flat Roofs
- Closed Crawlspaces
- Foam Insulation
- Eaves and Overhangs
- Exterior Claddings

Green or Flat Roofs

- Green Roofs in an Area with Formosan Termites is a **VERY BAD** Idea.
- All Plant Material is a termite food source.
- All Green Roofs will eventually become infested with Formosan Termites.
- Formosan will create leaks as they forage.
- No way to treat effectively once infested.
- All Flat Roofs will leak in the near future.

Green Roof


Vegetation
Growing Medium
Drainage, Aeration, Water Storage and Root Barrier
Insulation
Membrane Protection and Root Barrier
Roofing Membrane
Structural Support

Closed Crawlspaces

- Should the Pest Control Industry be in the moisture control business?
- My opinion in most cases is “NO”!
- I believe most companies are not qualified and do not have the education or experience to deal with this issue.
- Would you hire an building contractor to do your termite and pest control services?
- Prices range from $2,500 to $9,000 for the same job?

www.crawlspaces.org

A Quick Reference on Closed Crawl Spaces

www.crawlspaces.org

Getting Started

Both scientific research projects and real-world installations demonstrate that properly closed crawl spaces can provide much better moisture control than conventional, wall-vented crawl spaces in temperate-humid climates. Homes with closed crawl spaces (often also called "sealed," "unvented" or "conditioned" crawl spaces) also can save significantly on energy when compared to homes with wall-vented crawl spaces.

This sheet summarizes key issues that builders, code officials and consumers should keep in mind when deciding how to design or install closed crawl spaces in new construction.

The second sheet provides two sample designs that have been field-tested and extensively monitored.

For more details and information on improving wall-vented crawl spaces in existing homes, visit www.crawlspaces.org.

DESIGNING CLOSED CRAWL SPACES

The recommended components of a good design fall into six major categories:

Moisture Management

- A roof runoff system to direct water away from the house
- Site grading and landscaping that directs ground surface water away from the house
- Foundation drains and foundation damp-proofing or water proofing to protect the structure from sub-surface water
- Air sealing of the access door, perimeter wall and perimeter framing to prevent the entry of moisture-laden outside air and to separate the crawl space from areas under porches or decks
- An access door that is protected from roof runoff, at least 4" higher than the exterior soil grade and made of a non-corroding material, especially in coastal communities
- A fully sealed vapor retarder on the floor and perimeter walls to reduce evaporation of water into the crawl space
- Appliance discharge pipes and exhausts from kitchens, bathrooms and clothes dryers that terminate outside the crawl space
- A mechanical drying system to reduce humidity (for example, a supply of conditioned air or a dehumidifier)
- Drains with backflow valves or sump pumps to remove liquid water from the crawl space if necessary
- Flood vents that minimize standby air leakage, when required

Pest Control

- A termite inspection gap at the top of the perimeter wall to facilitate detection
- Batt insulation in the band joist area of wall-insulated closed crawl spaces to facilitate inspection or treatment

Combustion Safety

- Specification of direct-vent ("two-pipe") combustion appliances to ensure adequate combustion air for fuel-fired appliances, if applicable. Some manufacturers have direct-vent cabinets for use with non-direct-vent models. Alternate means of providing combustion air must be approved by the appliance manufacturer and local residential code requirements.
- For homes on slabs, basements or crawl spaces, specification of carbon monoxide monitors or alarms if the structure has an attached garage or any combustion appliances
- For homes on basements or crawl spaces, optional specification of an appropriately placed raw gas leak alarm if fuel-fired appliances or fuel lines are in the home

Fire Safety

- Air sealing of all penetrations in the sub-floor with non-porous materials
- Documentation of fire rating to allow installation of exposed foam insulation without a thermal barrier, if applicable
- Documentation of fire rating to allow installation of exposed facing or backing materials on batt insulation, if applicable

Thermal Insulation

- Insulation at the sub-floor or at the perimeter wall to provide the R-value required by the local residential code. Note that perimeter insulation may be located on the interior surface, exterior surface or inside the perimeter wall, or the perimeter wall itself may provide the required R-value.
- Insulation at the sub-floor installed without gaps or compression and in full contact with the sub-floor to achieve nominal R-value
- Non-porous insulation if the perimeter wall is insulated
- Insulation on the crawl space access(es) of minimum R-2

Radon Control

- In areas where radon is a risk or where the local residential code requires control of radon or other soil gases, houses with closed crawl space foundations can be tested, monitored and, if necessary, mitigated with the same techniques used for houses with a slab or basement foundation in the same region.
- The U.S. Environmental Protection Agency and the Surgeon General recommend testing all homes for radon.

Advanced Energy

HIGH-PERFORMANCE HOMES

Things to Consider #1

- Consult with your Termite Control Company before making any repairs or modifications to your crawlspace. Certain modifications may cause your Termite Control Company to cancel their contract on the structure if their inspection and treatment areas are restricted. Their involvement at the beginning of this process will typically avoid any contractual issues. It would be prudent to treat the wood and/or soil prior to any coverings that may be placed or sprayed over these areas.

Things to Consider #2

- When installing a (10-mil+ recommended) poly moisture vapor barrier for 100% of the crawlspace: Tape and mastic the joints together. Cut and anchor the poly so that it is flush or slightly resting against the foundation walls and piers. **If there is no moisture seeping through the foundation wall, preferably do not seal the poly to the foundation walls or piers.** The purpose of this is to not restrict the annual termite inspections and periodic retreatments. If the poly is to be sealed to the foundation, leave as much of the foundation wall exposed as possible (1 to 2 feet is preferred).
- Moisture may wick up the block.

Inspection Gap

Inspection Gap

Things to Consider #3

- Insulation: It is better to insulate the crawlspace sub floor and not the foundation wall due to the termite pressure in South Carolina.
- If insulation is to be placed on the foundation wall it must be **6 to 8" above the soil** and **3 to 6" below the sill**.

Things to Consider #4

- Install a dehumidifier designed specifically for crawlspaces
- Condition the air space in the crawlspace with an air supply from the living space
- You can also utilize the HVAC system duct work in the crawlspace.

These

Residential Basement and Crawlspace Price List

Therma-Stor LLC

Santa Fe Advance Dehumidifier & Accessories			Retail	Dealer
	4025699	Santa Fe Advance Dehumidifier	$925.00	$775.00
	4026055	Advance Duct Kit	$75.00	$55.00
	4025845	Advance Condensate Pump Kit	$85.00	$75.00
	4025831	Aluminum Mesh/Foam Pre-Filter	$7.00	$6.00
	4025568	Standard Filter 12" x 12" x 1" MERV 11	$8.00	$7.00

Santa Fe Dehumidifier & Accessories			Retail	Dealer
	4021400	Santa Fe Dehumidifier	$1,095.00	$875.00
	4021453	Santa Fe Duct Kit	$75.00	$55.00
	4020623	8" Supply Collar	$12.00	$9.00
	4022220	Condensate Pump Kit	$75.00	$55.00
	4022561	Santa Fe Muffler Kit	$75.00	$55.00
	4021468	Black Foam Pre-Filter	$5.00	$4.00
	4021475	Standard Filter 16" x 20" x 2" MERV 11	$7.00	$6.00

Santa Fe HC Dehumidifier & Accessories			Retail	Dealer
	4025081	Santa Fe HC Dehumidifier	$1,375.00	$1,025.00
	4024368	10" Inlet Collar	$12.00	$9.00
	4022220	Condensate Pump Kit	$75.00	$55.00
	4021475	Standard Filter 16" x 20" x 2" MERV 11	$7.00	$6.00
	4025463	Santa Fe HC Cart	$75.00	$55.00

Santa Fe Dehumidifier General Accessories			Retail	Dealer
	4020175	Honeywell Dehumidistat	$79.00	$40.00
	4020128	6" x 25' Insulated Flex Duct	$40.00	$25.00

Santa Fe RX Dehumidifier & Accessories			Retail	Dealer
	4023673	Santa Fe RX Dehumidifier	$1,375.00	$1,175.00
	4023869	Secondary Filter Housing	$110.00	$95.00
	4024145	Hepa Filter 99.976% Efficient 20" x 32" x 4"	$225.00	$180.00
	4022489	95% Filter 16" x 20" x 4" (use 2) MERV 14	$87.00	$72.00
	4023612	Carbon Filter 16" x 20" x 3" (use 2)	$90.00	$77.00
	4024264	Pleated Filter 16" x 20" x 1" (use 2)	$9.00	$8.00
	4021475	Standard Filter 16" x 20" x 2" MERV 11	$7.00	$6.00
	4024528	Bulk Activated Carbon Granules	$115.00	$90.00

Not These

Foam Insulation

- Must be kept 6” above grade
  - Clemson Bulletin #9
- This includes all foam board and Spray Foam
- **DO NOT** use open cell Foam in a the crawlspace! **IT IS A SPONGE!**
- Subterranean Termites Love to tunnel through Foam – man made tube.

Foam Applications

- Closed-cell foam insulation is resistant to moisture, has a higher R-Value per inch than standard insulation, and can add structure strength to the sub floor system.
- It is better to insulate the crawlspace sub floor and not the foundation wall due to the termite pressure in South Carolina.
- If possible, **do not** install insulation on crawlspace foundations walls, sills and sub floor (12 inches) **behind dirt filled porches**, sills and sub floor (12 inches) **behind decks**, sills and sub floor **under fireplaces**, and **around all plumbing penetrations** (12 inches).
- The "12 inches" refers to the wood sub floor and/or joists in those areas.

Foam Applications cont.

- These areas will eventually have some form of moisture intrusion or plumbing leaks and will be a condition conducive to termite infestations.
- The insulation can trap moisture in these areas if a leak occurs.
- These areas need to be accessible for inspection and periodic treatments.

Eaves and overhangs

- All Structures with little or no eave or overhangs are more prone to moisture problems.
- Bulk moisture directly next to foundations will move the soil.
- Soil movement will decrease the effectives of a Termite treatment.

Exterior Claddings

- **The GOOD**
- Treated Plywood - First Row
- Composites

  Hardie Plank

  PVC
- Flashing and Caulking details are still important with Composites

Exterior Claddings

- **The BAD**
- Stucco of any kind over wood!!
- OSB, Press Board, MDF
- Newer OSB is improving
- Foam of any kind in contact with or close to the Soil
- Superior Walls – remove bottom 6” of foam before slab is poured.

Termite Hot Spots

- Dirt Filled Porches
  and/or raised planters
- Decks – splash
- Fireplace Chimneys – all leak
- Garage Doors – expansion
  joints – driveways are steering termites to the structure.

Wood & Soil Treatments

- **Wood Treatments** Use EPA Register Products
  - Bora-Care, Mold-Care, BorRam, MoldRam
- **Blue Wood -** not as strong.
- **Termidor** - The # 1 control product on the market today (www.termidorhome.com)
- **Bait Systems -** not effective as a stand alone Termite Control product in the Southeast.
  - (My Opinion)

Results/Conclusions

What Have We Done?

- Increased our awareness on moisture and fungi during annual inspections
- Became proactive on educating our customers with better communications and documentation
- Made our customers aware of their responsibilities
- Significant growth with less termite infestations

- We need to work together – Keep an open Mind