

U.S. Army Heat Treatment Experiences: From Cockroaches to Nematodes

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Preventive Medicine



Facility Preparation

- Shut off all equipment
- Remove
 - Perishables, Spices, Bread, Fruit
 - Compressed gas cylinders
 - Flammables
 - Computers, TVs
- Applied Gentrol, insect growth regulator



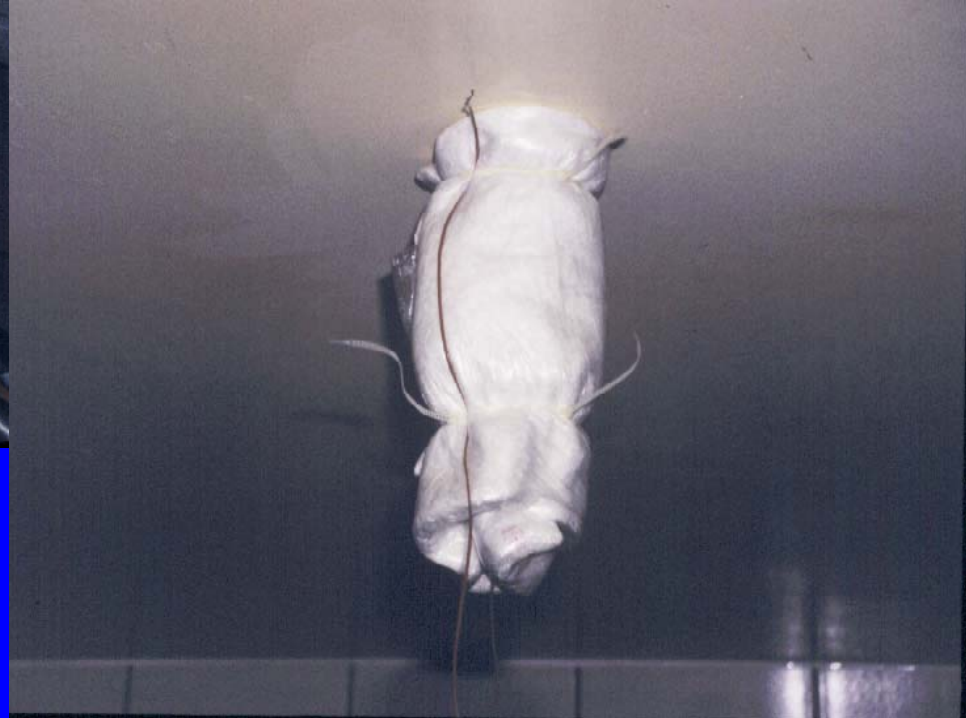
Clear the floor

Prevent

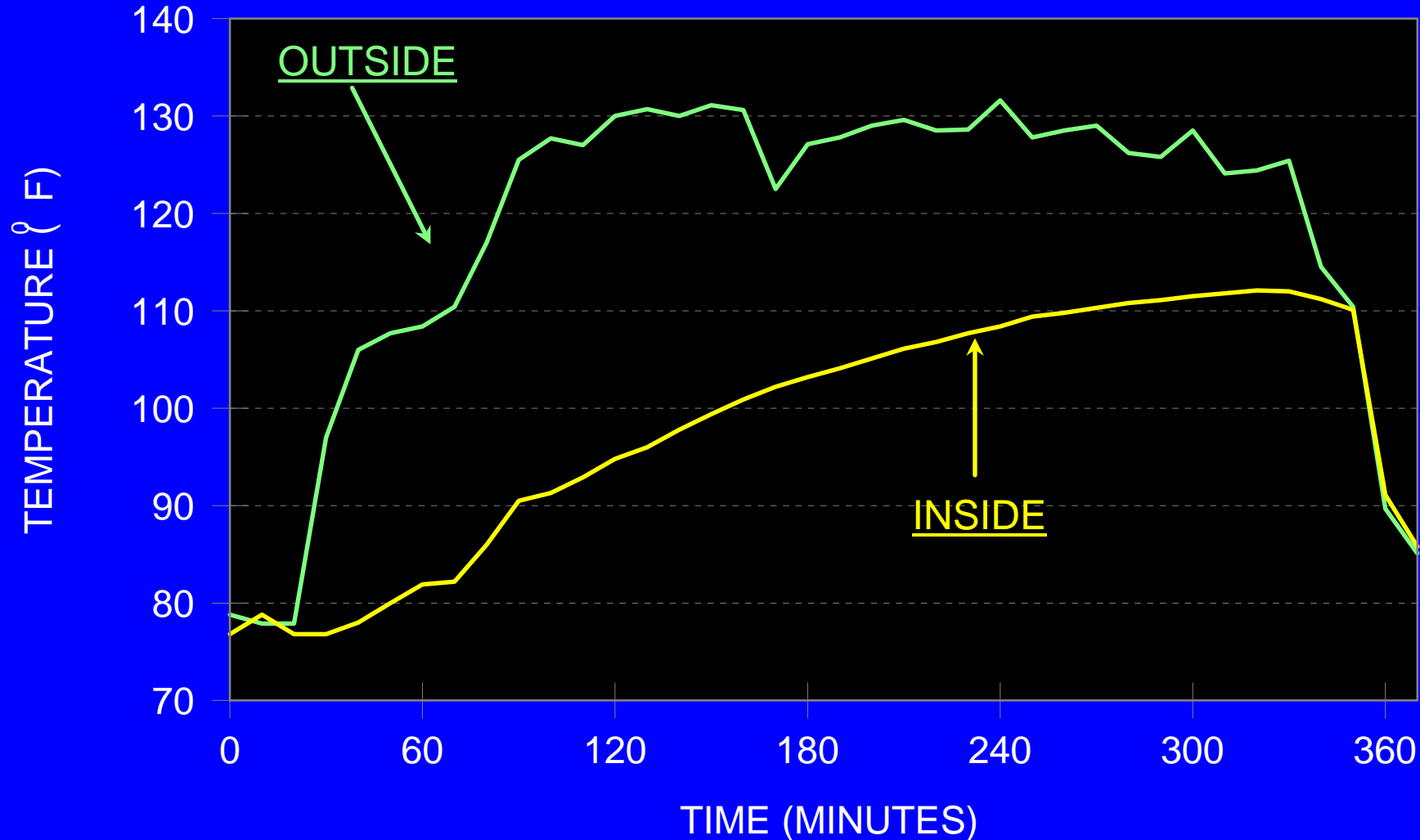


Escapes

Prevent Damage



SPRINKLER HEAD: TEMPERATURES INSIDE AND OUTSIDE OF INSULATOR

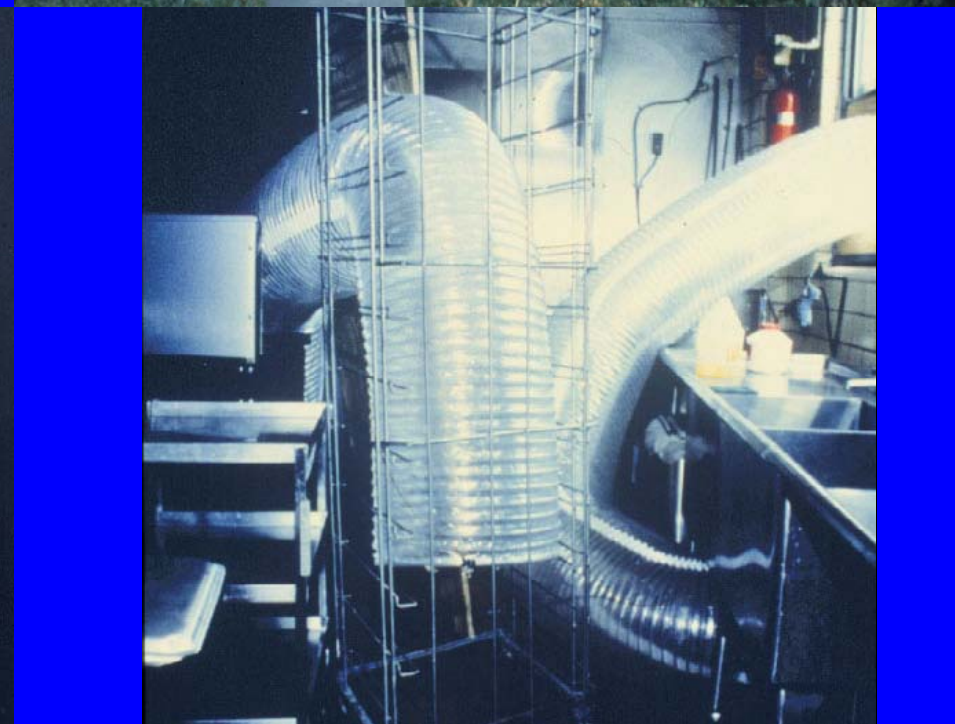


Corral

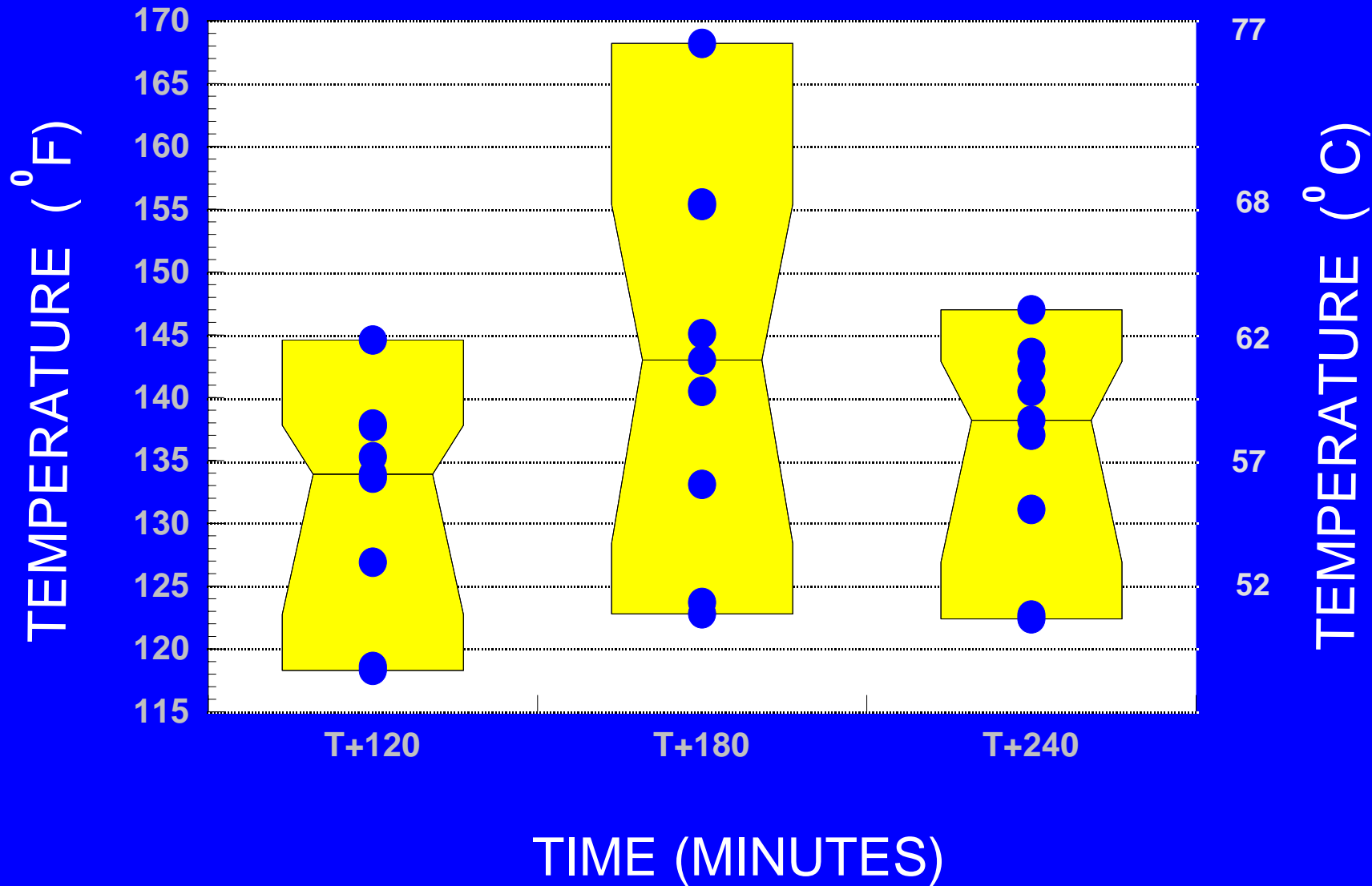


Heat

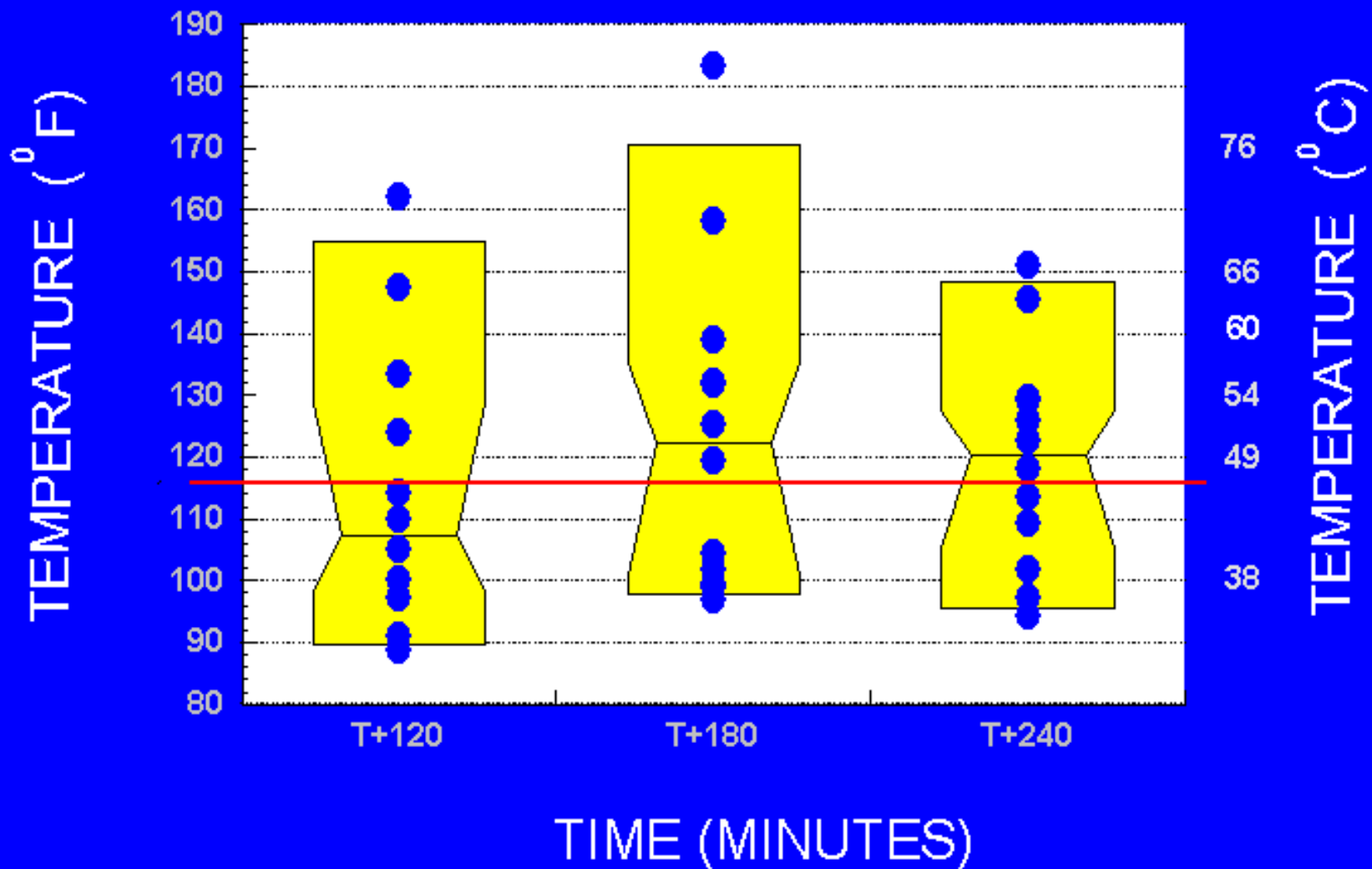
Setup Heaters



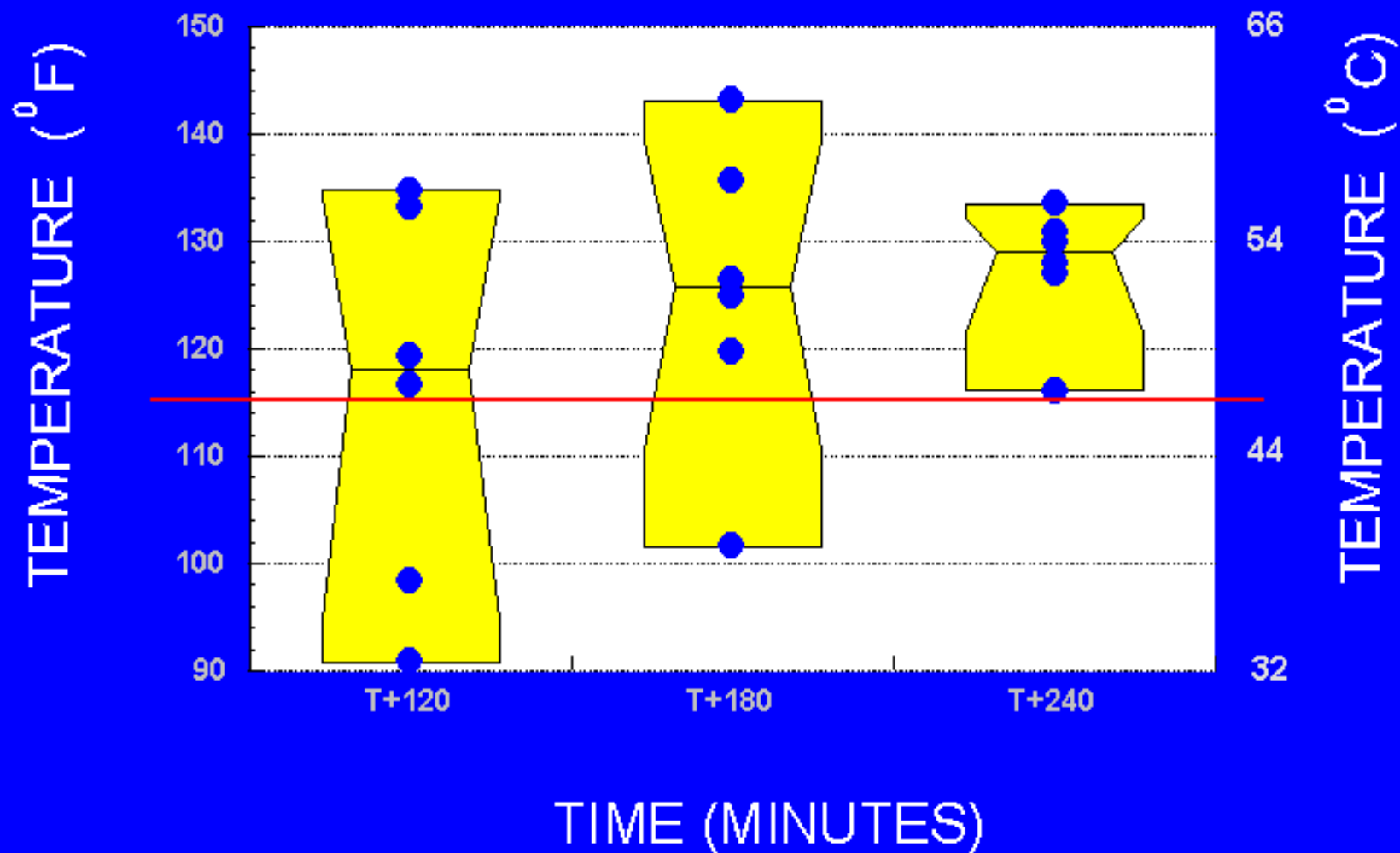
VARIATION OF CEILING TEMPERATURES



VARIATION OF FLOOR TEMPERATURES



VARIATION OF HARBORAGE TEMPERATURES

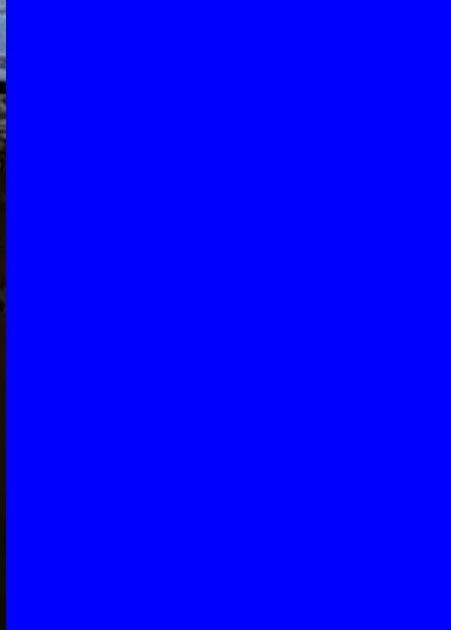




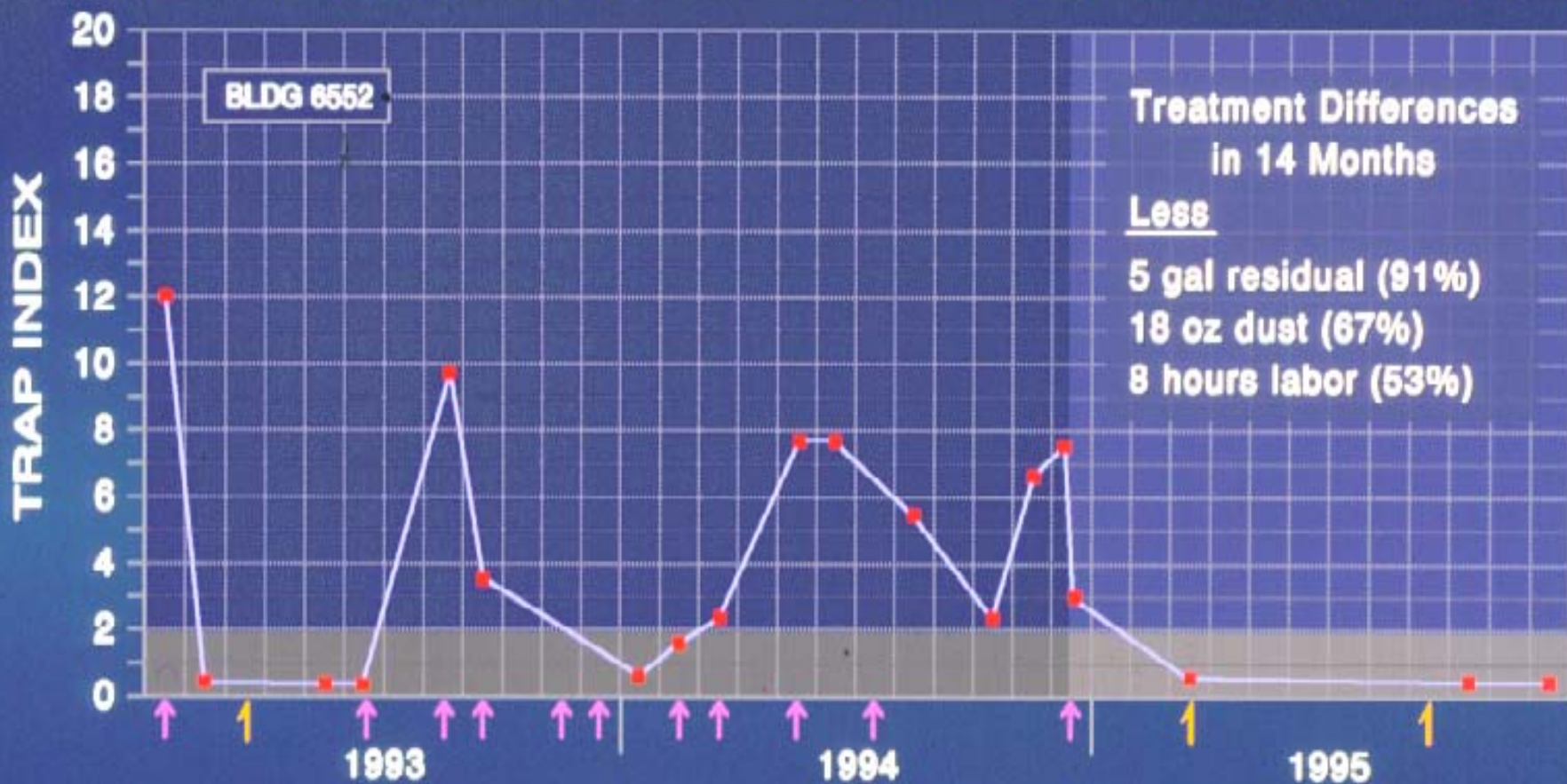
4 –6 Hours Dead Cockroaches



Vacuum the Living

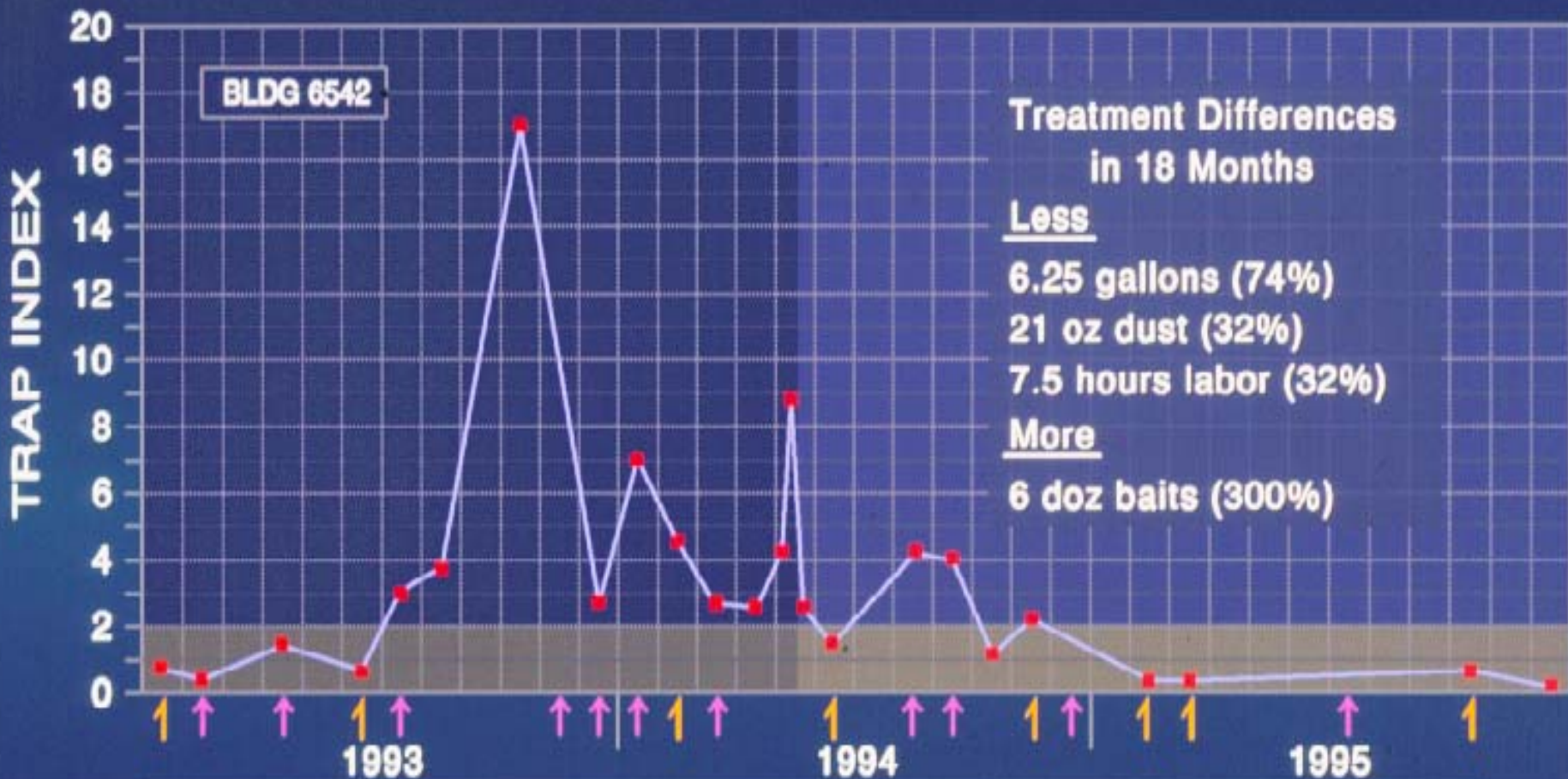


THERMAL CONTROL TRAP INDEX BEFORE AND AFTER



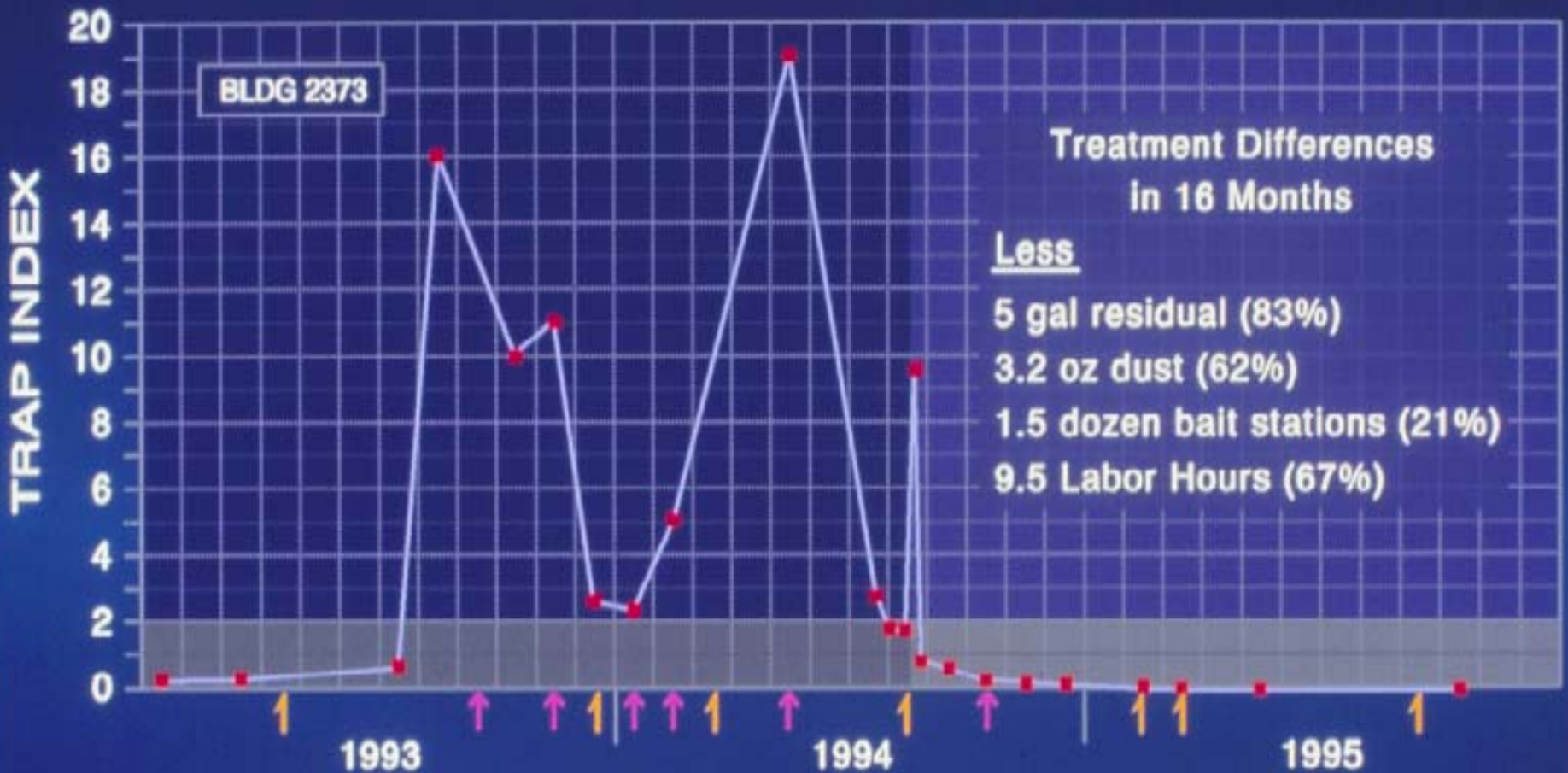
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- BEFORE THERMAL CONTROL
 AFTER THERMAL CONTROL
- PESTICIDE TREATMENTS
 ONLY DUST & BAIT STATIONS
- TRAP INDEX (NUMBER OF COCKROACHES PER STICKY TRAP PER NIGHT)
- TRAP INDEX OF 2.0 IS THRESHOLD FOR COMPLETE PESTICIDE APPLICATION

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BEFORE THERMAL CONTROL

AFTER THERMAL CONTROL

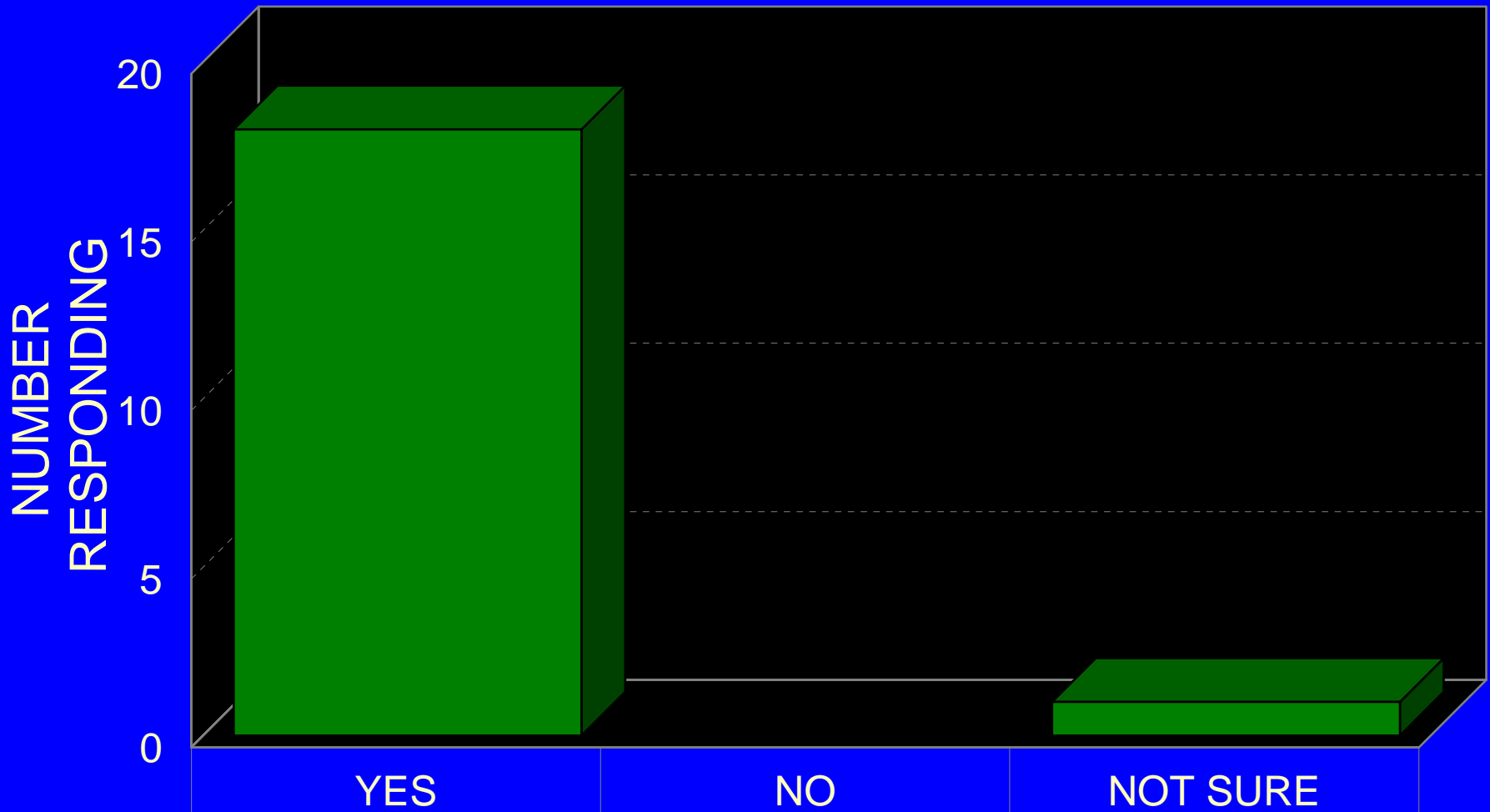
PESTICIDE TREATMENTS

ONLY DUST & BAIT STATIONS

TRAP INDEX (NUMBER OF COCKROACHES PER STICKY TRAP PER NIGHT)

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SHOULD METHOD BE OFFERED TO OTHER FACILITIES



Process Detailed

<http://chppm-www.apgea.army.mil/ento/TG208/TOC.HTM>

Why So Effective

- Heat penetrates all equipment harborage
- Gentrol® is an excellent complement
- Perhaps?
 - Population reduced below growth threshold
 - Interferes with chemical communication



Exotic Turkish land snail
(*Monaca syriaca*)

Native land snail
(*Succinea camestris*)



Field Trial on Shipping Container

Time	129 degree F			134 degree F	
	Turkish Snails	Native Snails		Turkish Snails	Native Snails
Control	0	28		0	38
20 Minutes	38	100		100	100
40 Minutes	100	100		100	100
60 Minutes	28	100		100	100
80 Minutes	100	100		100	100

Laboratory Test in Glass Vials in Water Bath

100% mortality after 30 minutes at 118 degrees F

Snail Trial Conclusions

- Laboratory studies of thermal death point needed
- We can heat the exterior of containers in a windproof enclosure
 - Quickly 2 – 3 hours
 - Without damaging contents inside
 - Inexpensively, \$25 energy cost

Thermal Chamber

- Collaborative effort with Topp Portable Air and Defense Logistics Agency
- Goal: Find an alternative to fumigation for commodity pest





SAFE-HEAT
Thermal Pest
Eradication System
1-800-892-8677

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Patent Pending

Eight Pallets of 20-lb Poly Pack Boxes of Macaroni – 4 Tons



PLACE

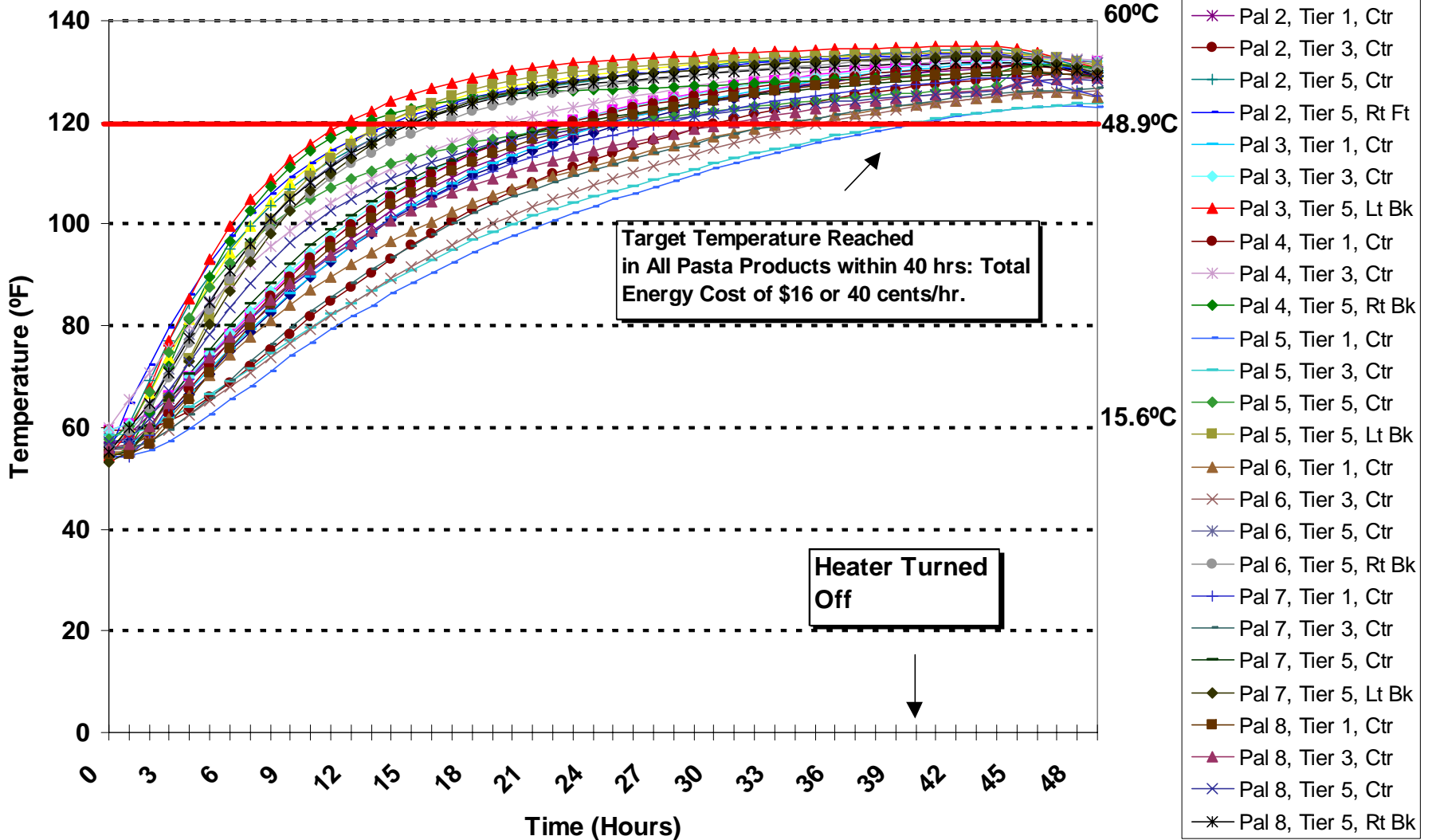


Cremette
 ELBOW MACARONI
 Enriched

3-2
ANNI



**Figure 8. Temperature Profile within 4 Tons of Palletized Macaroni,
Chamber Air Temperature 140°F (60°C)**







2nd Generation Thermal Chamber Results

- All product meet target temperature without exceeding the upper limit
- All insects dead
- No degradation of taste, color, or cooking characteristics
- Simple inexpensive operation



Pine Wilt Disease

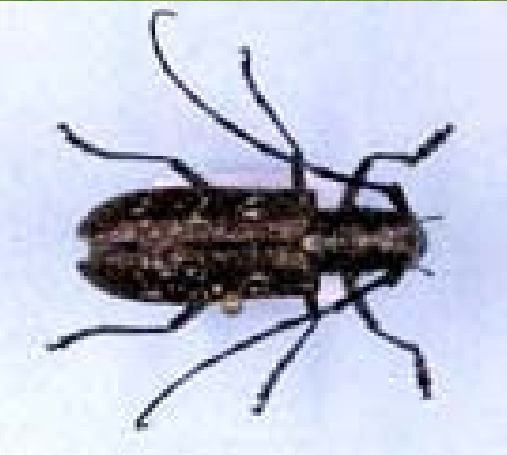
Pine Wood Nematode (*Bursaphelenchus xylophilus*) (pine chips, unseasoned lumber, packing-case wood)

Insect Vectors: Bark Beetles and Sawyer Beetles (pallets, crates, dunnage)

USA Distribution: 36 States

International Distribution: Canada, Mexico, Japan, China, S. Korea

Effective October 2001, wood packing entering European Union must be heat treated to 56° C for 30 minutes

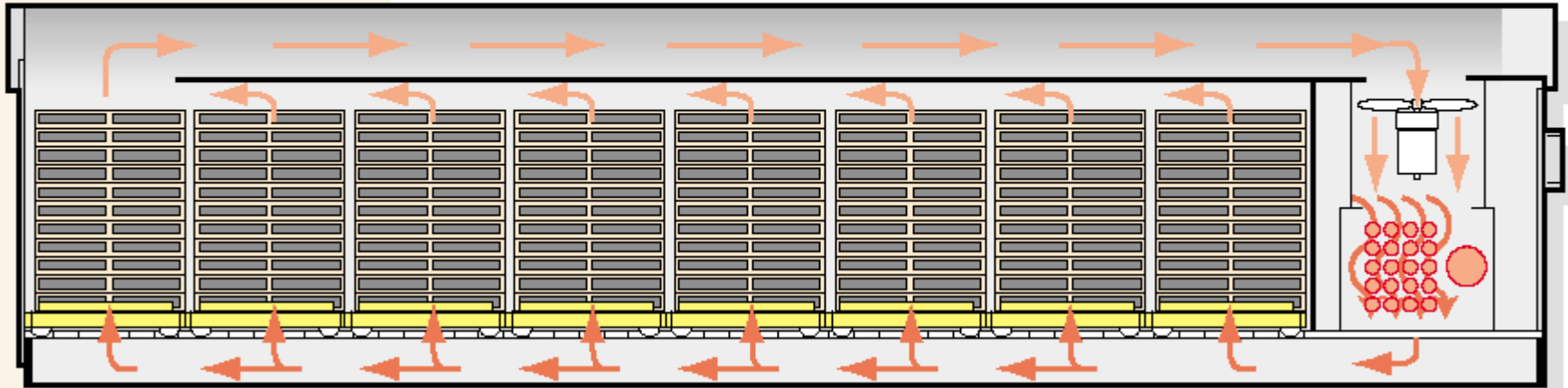


Whitespotted sawyer

A black and yellow forklift is positioned on the left, moving a pallet of lumber into a large, silver thermal pest management chamber on the right. The chamber's door is open, revealing a dark interior. The pallet is loaded with numerous wooden planks stacked on a yellow pallet. The scene is set in a warehouse or industrial facility.

**PEST-HEAT® Thermal
Pest Management Chamber**
Patent Pending

PEST-HEAT™ Precise Airflow Design Reduces Treatment Time



Airflow design is covered by multiple pending patents.

PEST-HEAT[™]
Thermal Pest Management Systems



**CAUTION
HOT**



3rd Generation Thermal Chamber

- All seasoned wood pallets meet target temperature **within 4 hours**
 - 3 runs per day capacity
- **Approved by USDA-APHIS** for the “56/30” treatment process
- Does **not affect pallet** service life
- Energy cost **5 cents per pallet**
- Additional information: <http://pestheat.com>

THERMAL PEST CONTROL

- Clearly it has a place
- Move a lot of controlled hot air quickly
- Recognize it's limitations