

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

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U. S. Army Center for Health Promotion and
Preventive Medicine



Facility Preparation

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



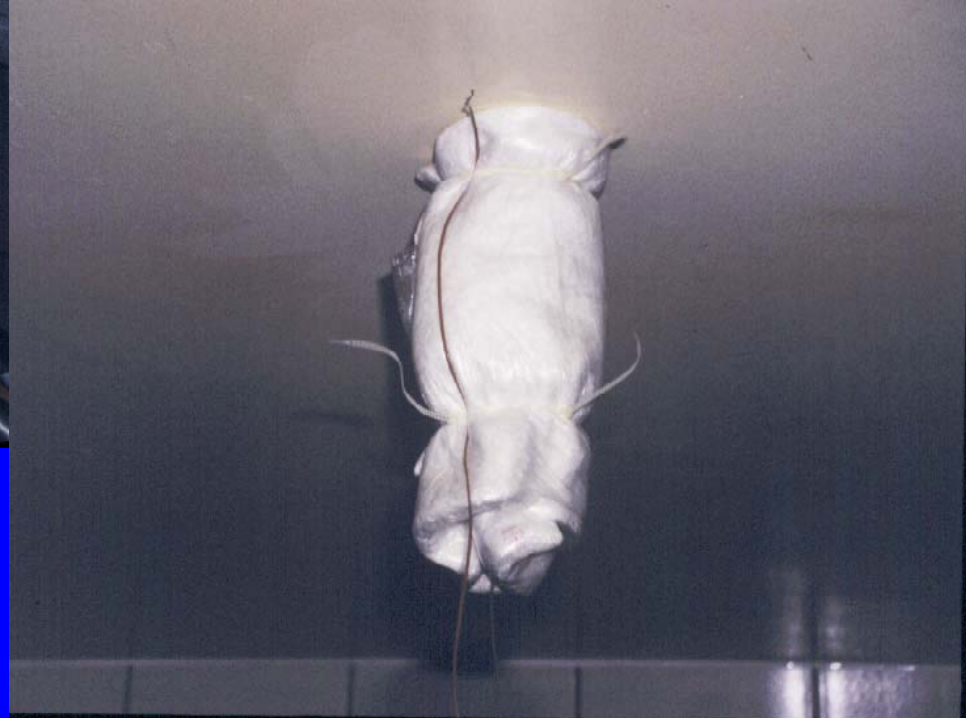
Clear the floor

Prevent

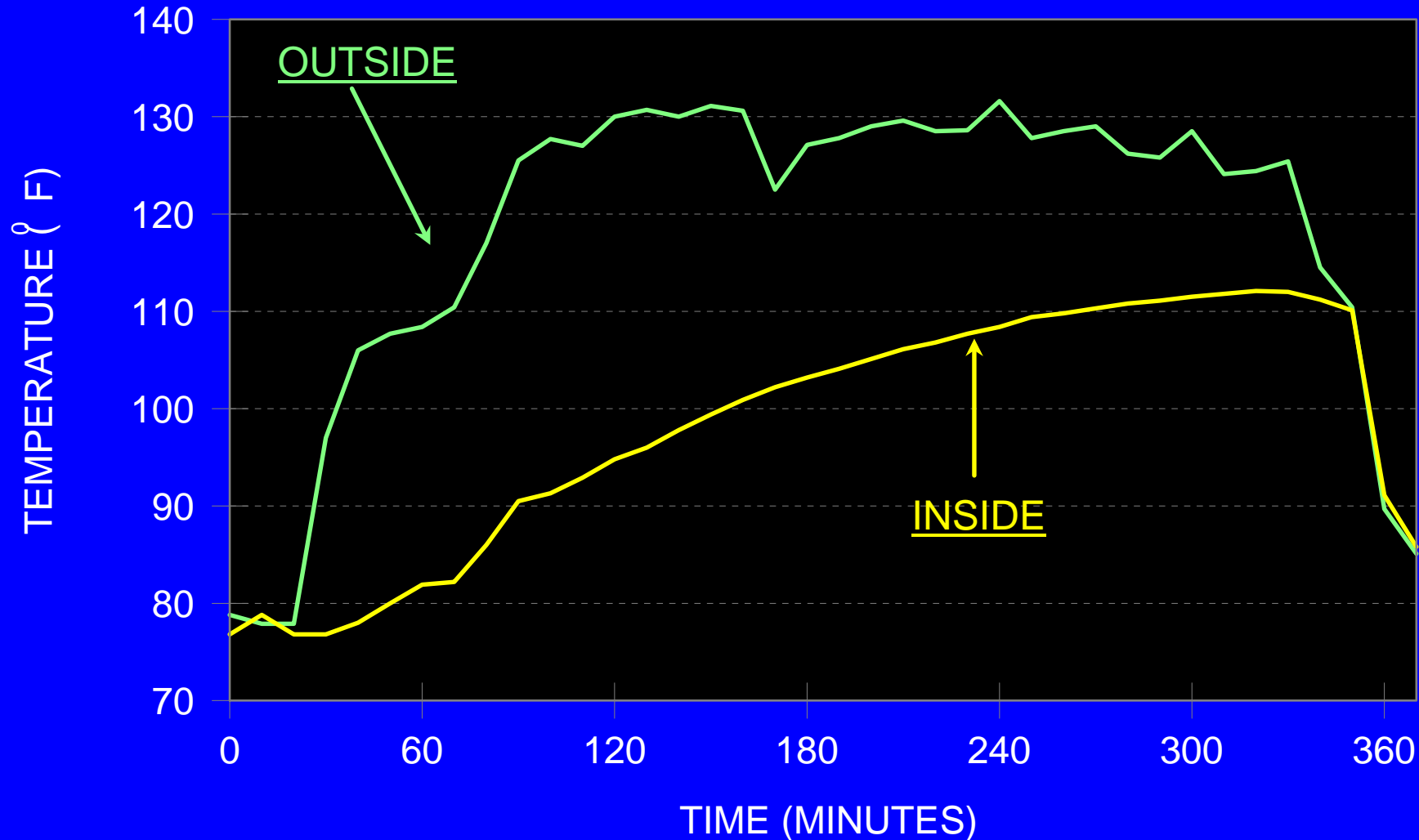


Escapes

Prevent Damage



SPRINKLER HEAD: TEMPERATURES INSIDE AND OUTSIDE OF INSULATOR

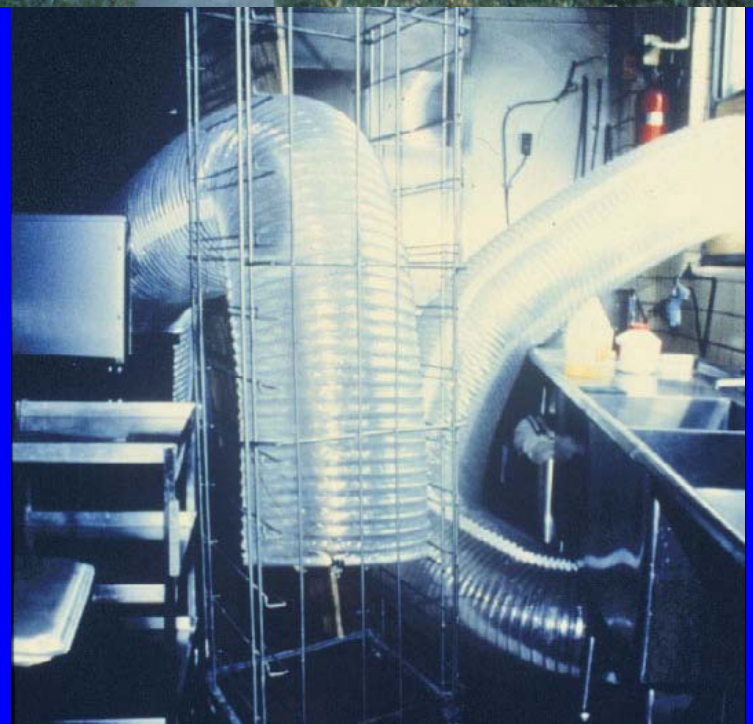


Corral

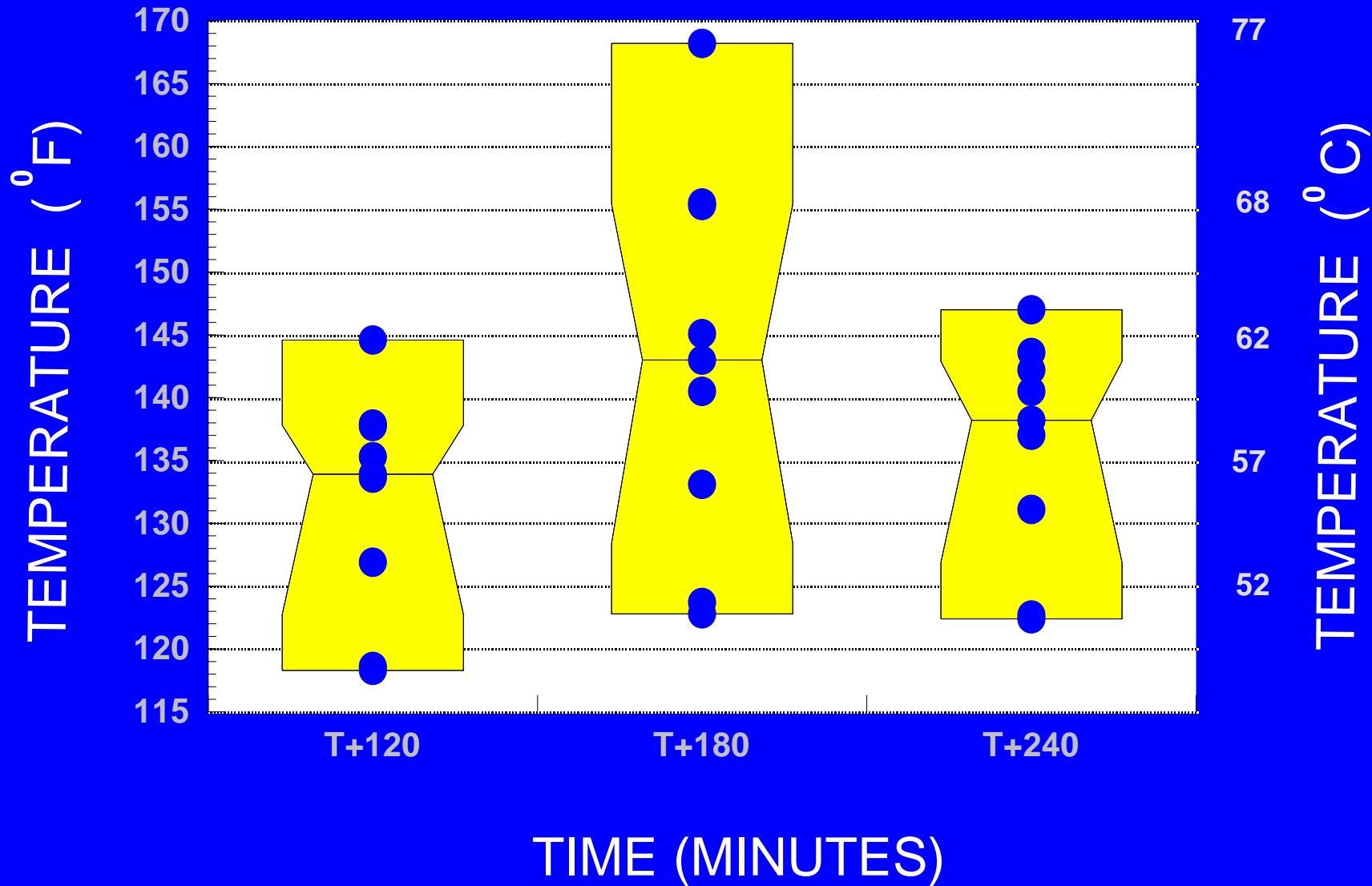


Heat

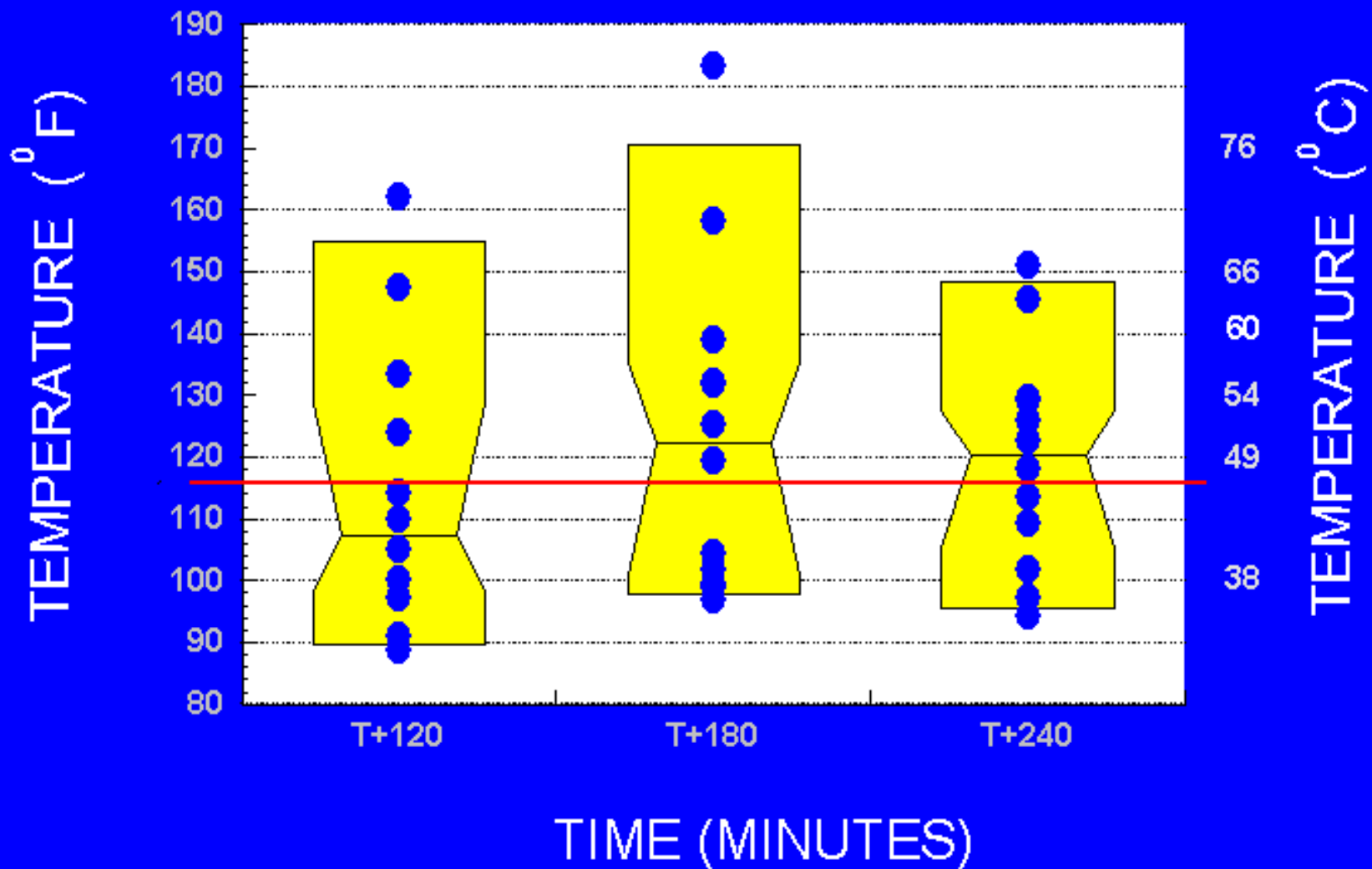
Setup Heaters



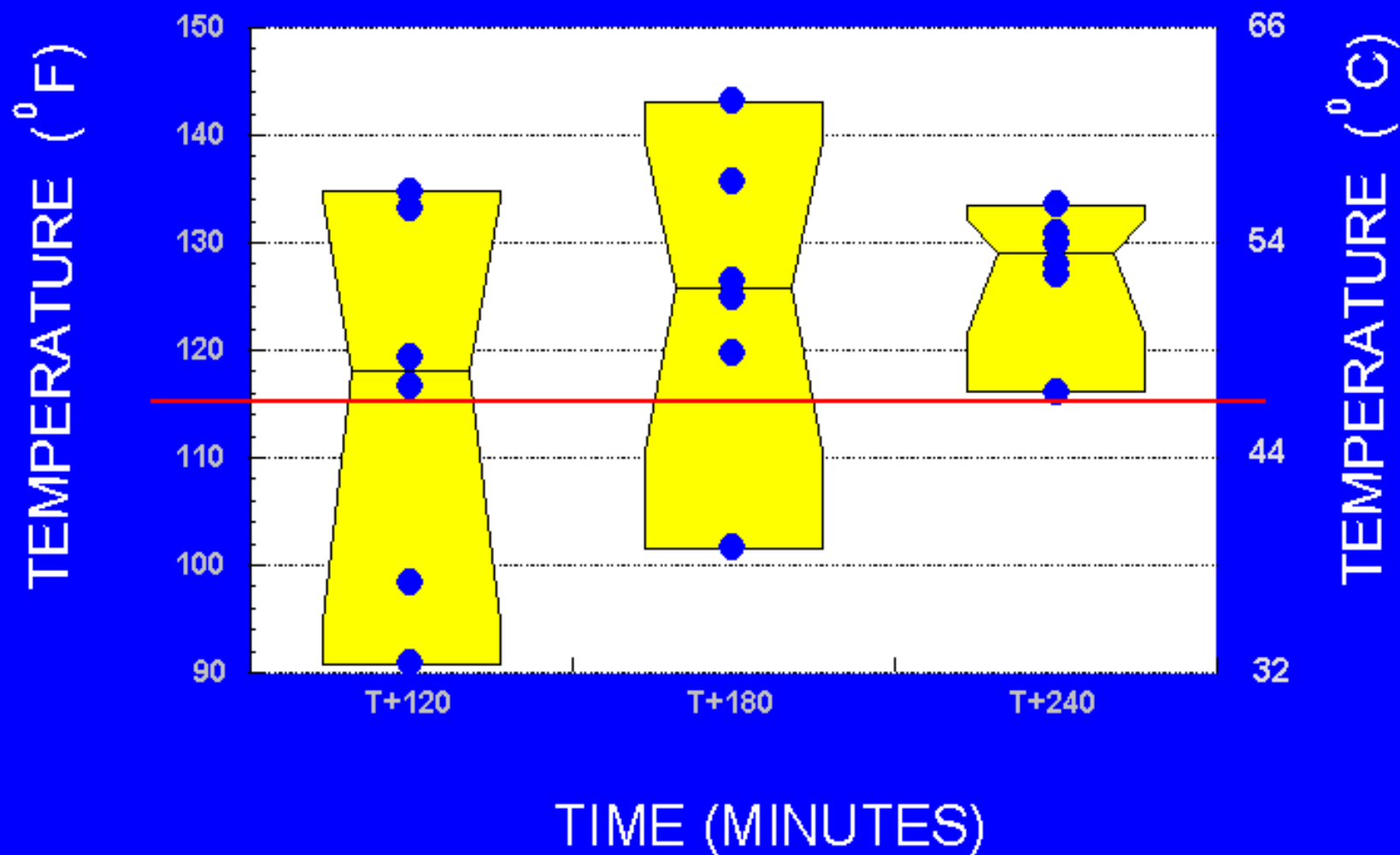
VARIATION OF CEILING TEMPERATURES



VARIATION OF FLOOR TEMPERATURES



VARIATION OF HARBORAGE TEMPERATURES





4 –6 Hours
Dead Cockroaches

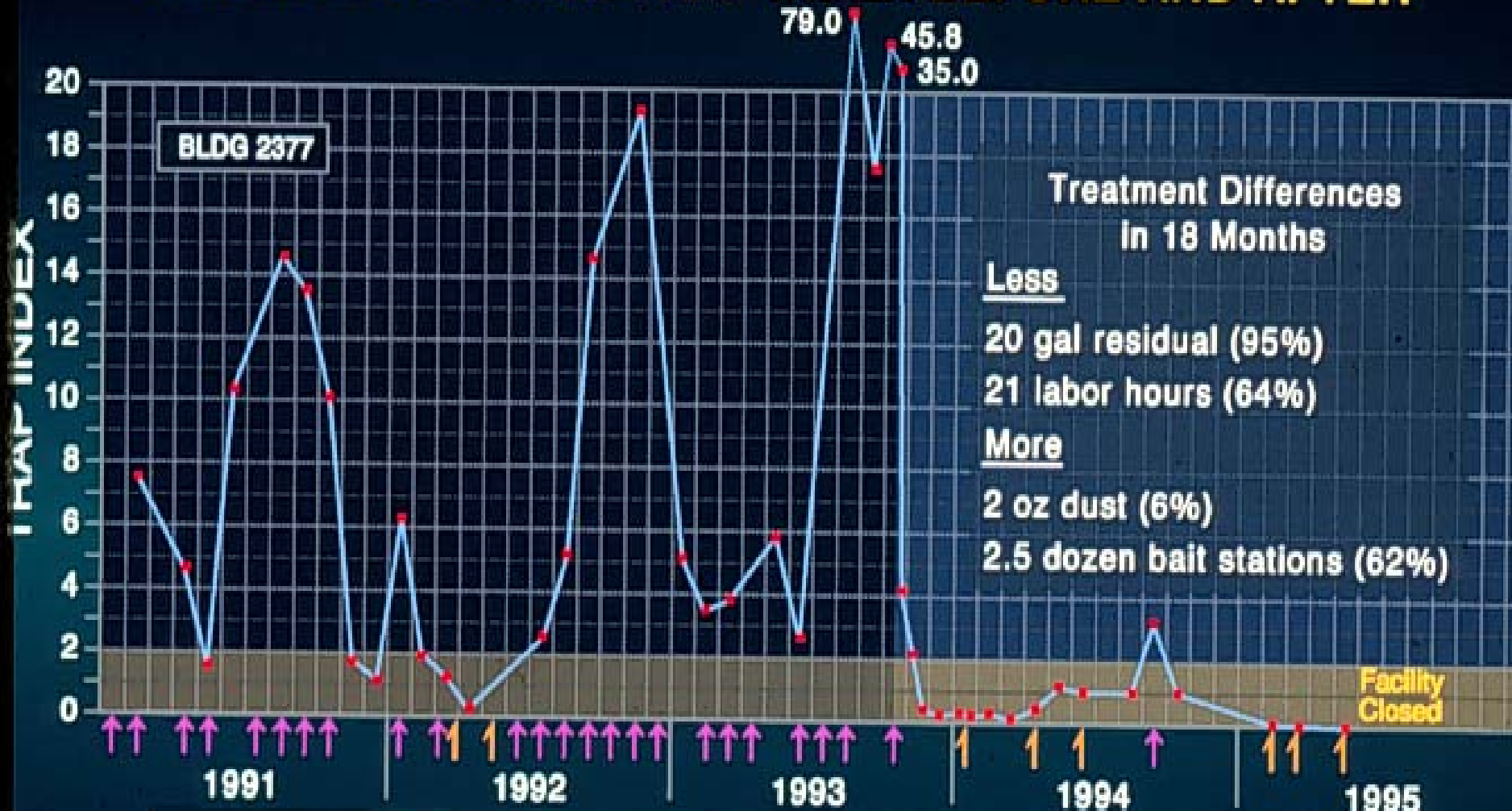


Vacuum the Living



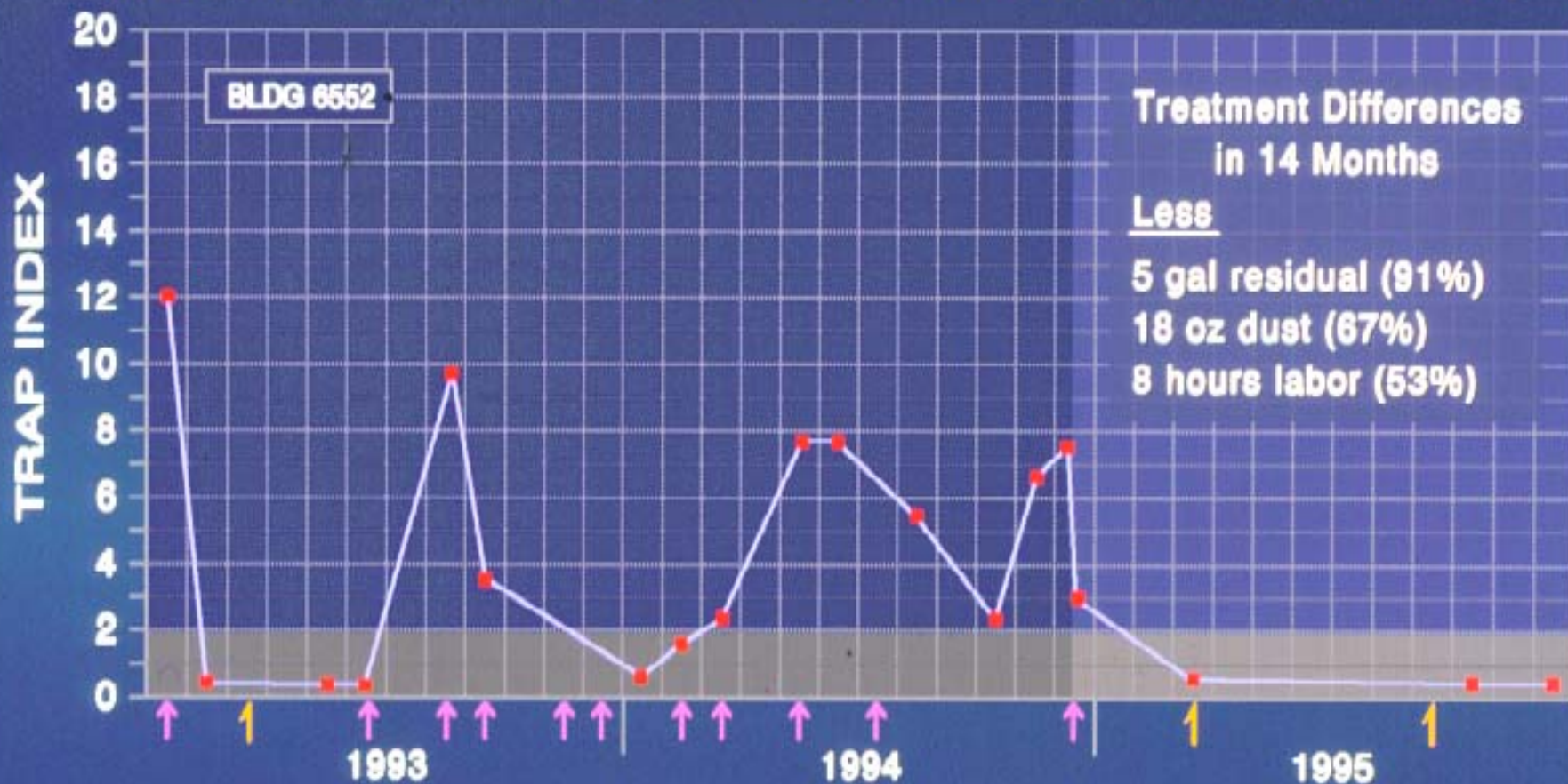


THERMAL CONTROL TRAP INDEX BEFORE AND AFTER



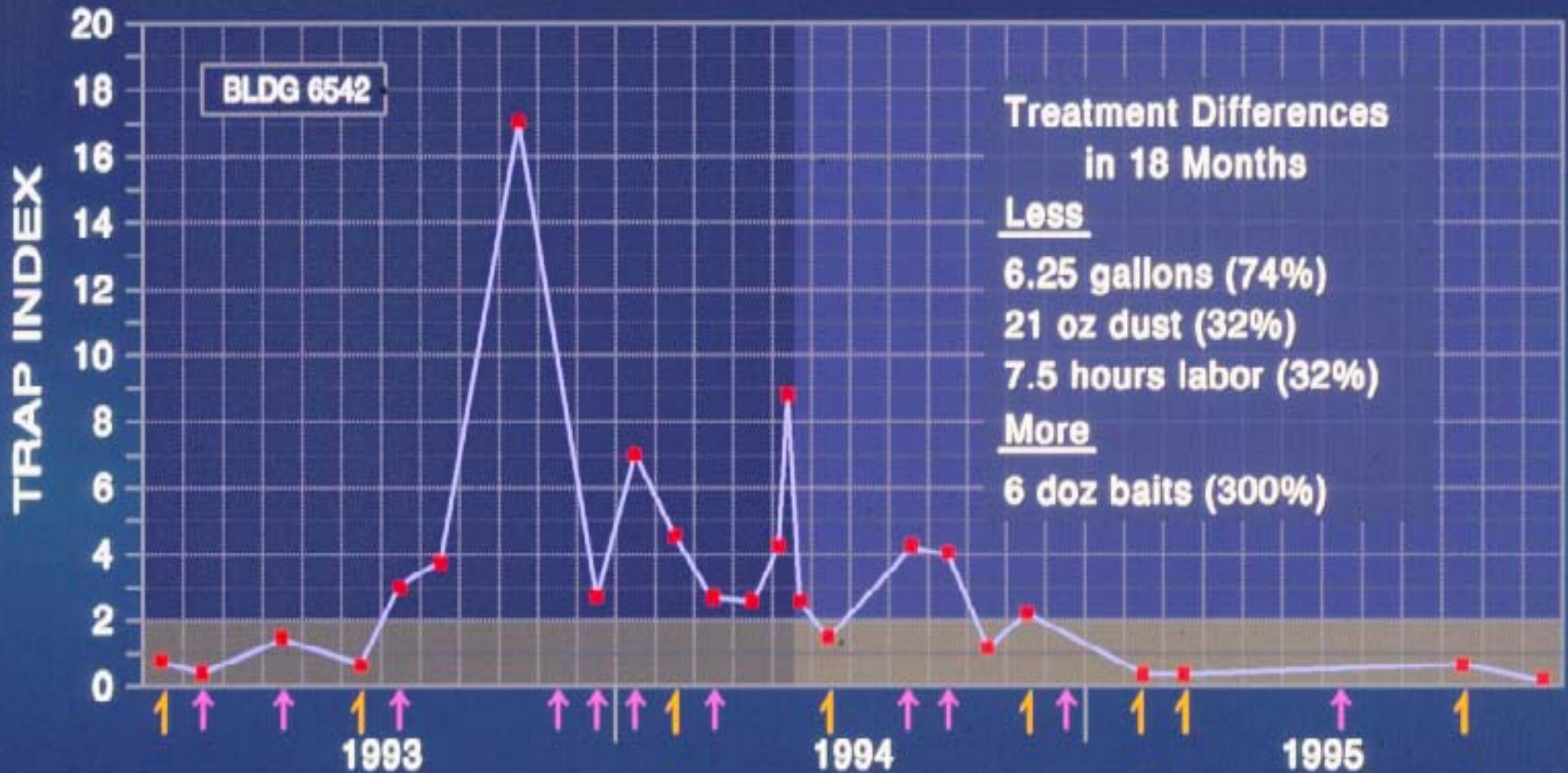
BEFORE THERMAL CONTROL	AFTER THERMAL CONTROL
PESTICIDE TREATMENTS	ONLY DUST & BAIT STATIONS
TRAP INDEX (NUMBER OF COCKROACHES PER STICKY TRAP PER NIGHT)	
TRAP INDEX OF 2.0 IS THRESHOLD FOR COMPLETE PESTICIDE APPLICATION	

THERMAL CONTROL TRAP INDEX BEFORE AND AFTER



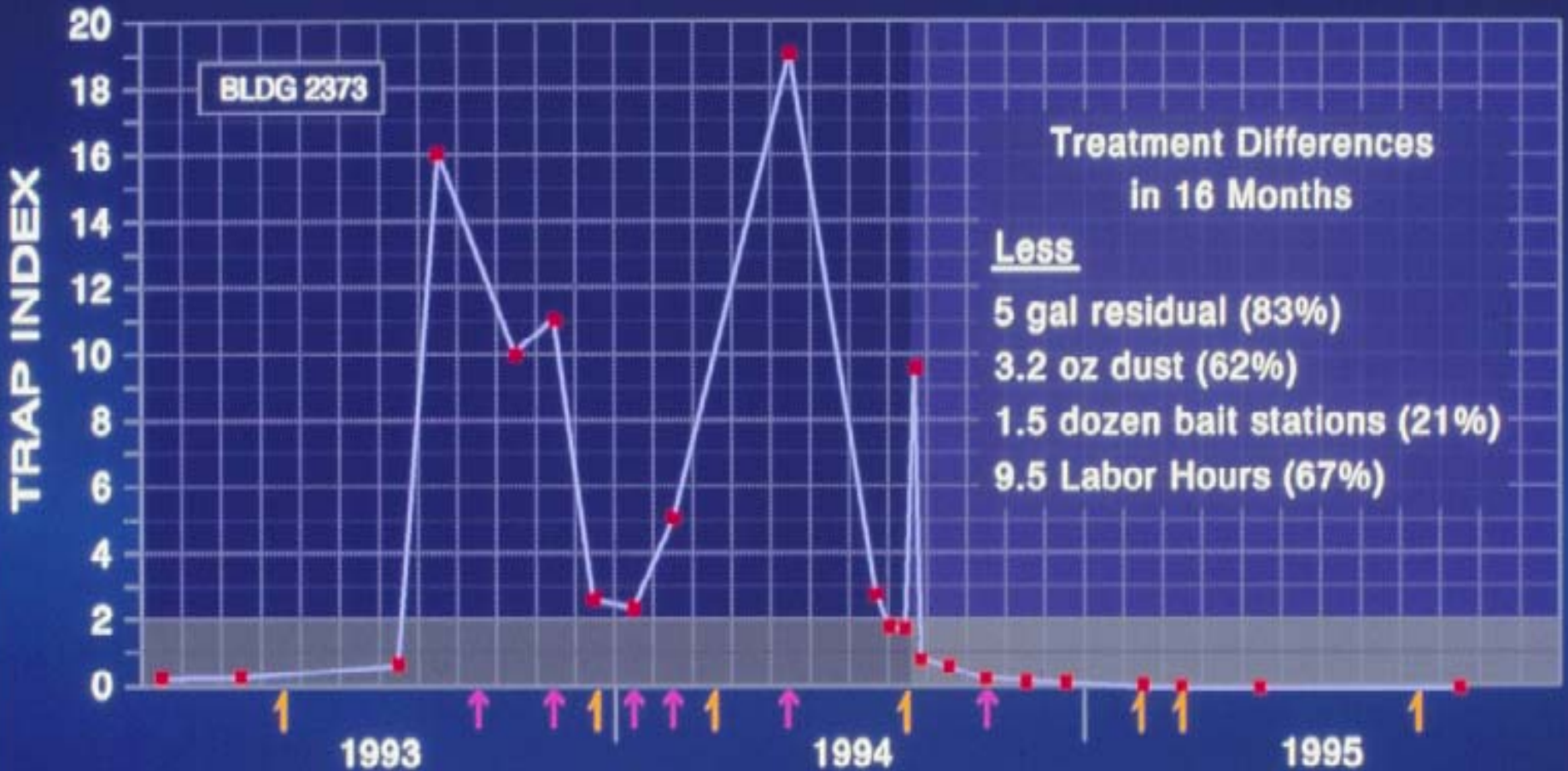
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BEFORE THERMAL CONTROL

AFTER THERMAL CONTROL

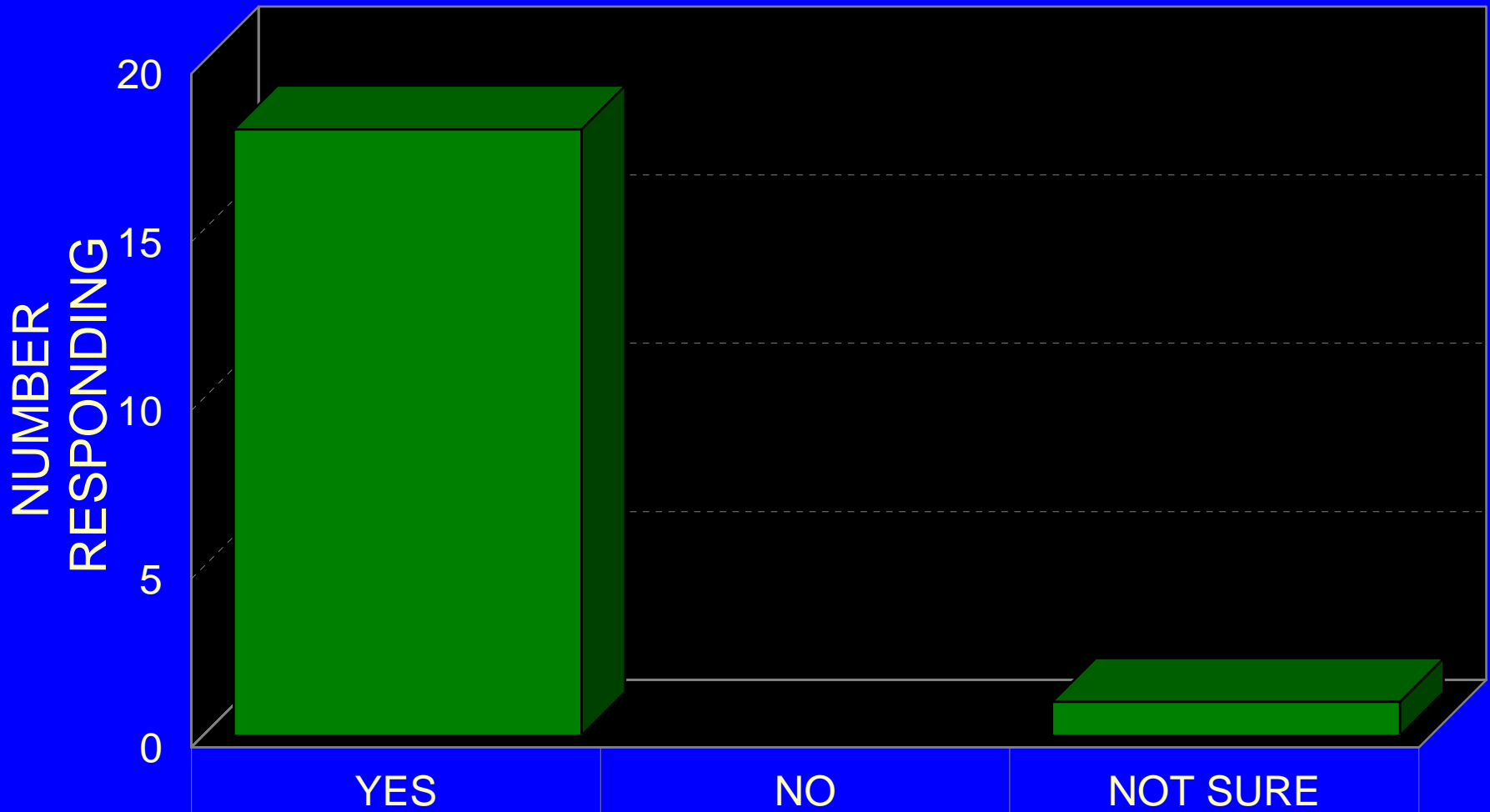
PESTICIDE TREATMENTS

ONLY DUST & BAIT STATIONS

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SHOULD METHOD BE OFFERED TO OTHER FACILITIES



Process Detailed

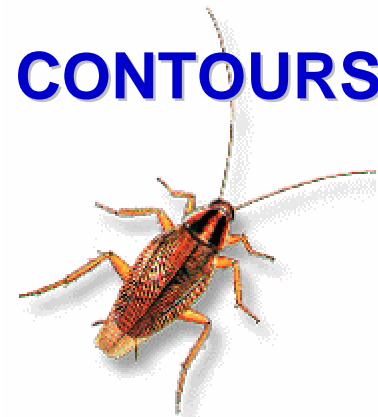
<http://chppm-www.apgea.army.mil/ento/TG208/TOC.HTM>

Why So Effective

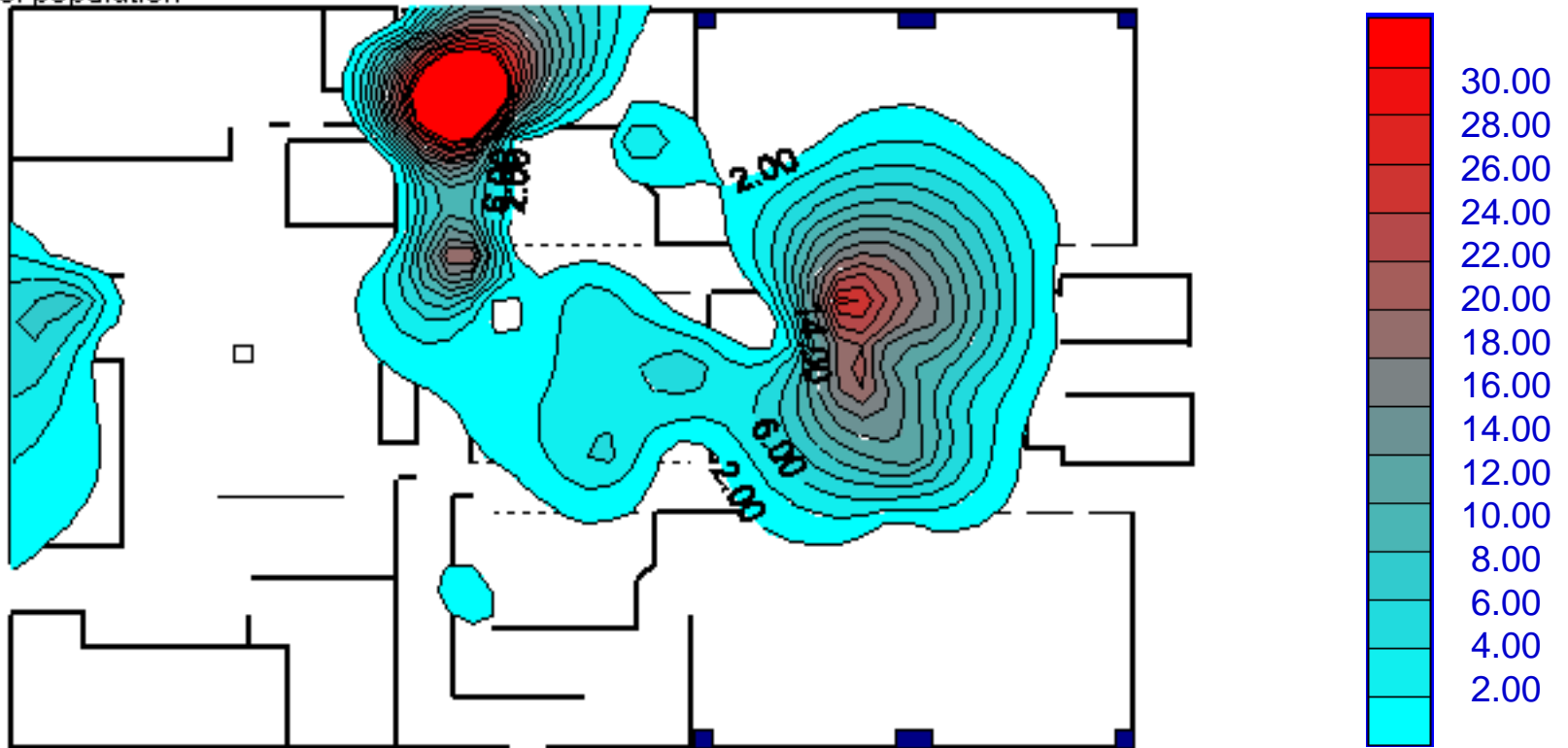
- Heat penetrates all equipment harborage
- Vacuum and Gontrol® were an excellent complement
- Perhaps?
 - Population reduced below growth threshold
 - Interferes with chemical communication
- Vacuuming and/or selective equipment heating may be viable stored product pest approach

GERMAN COCKROACH POPULATION CONTOURS

3.6 COCKROACHES/TRAP/NIGHT

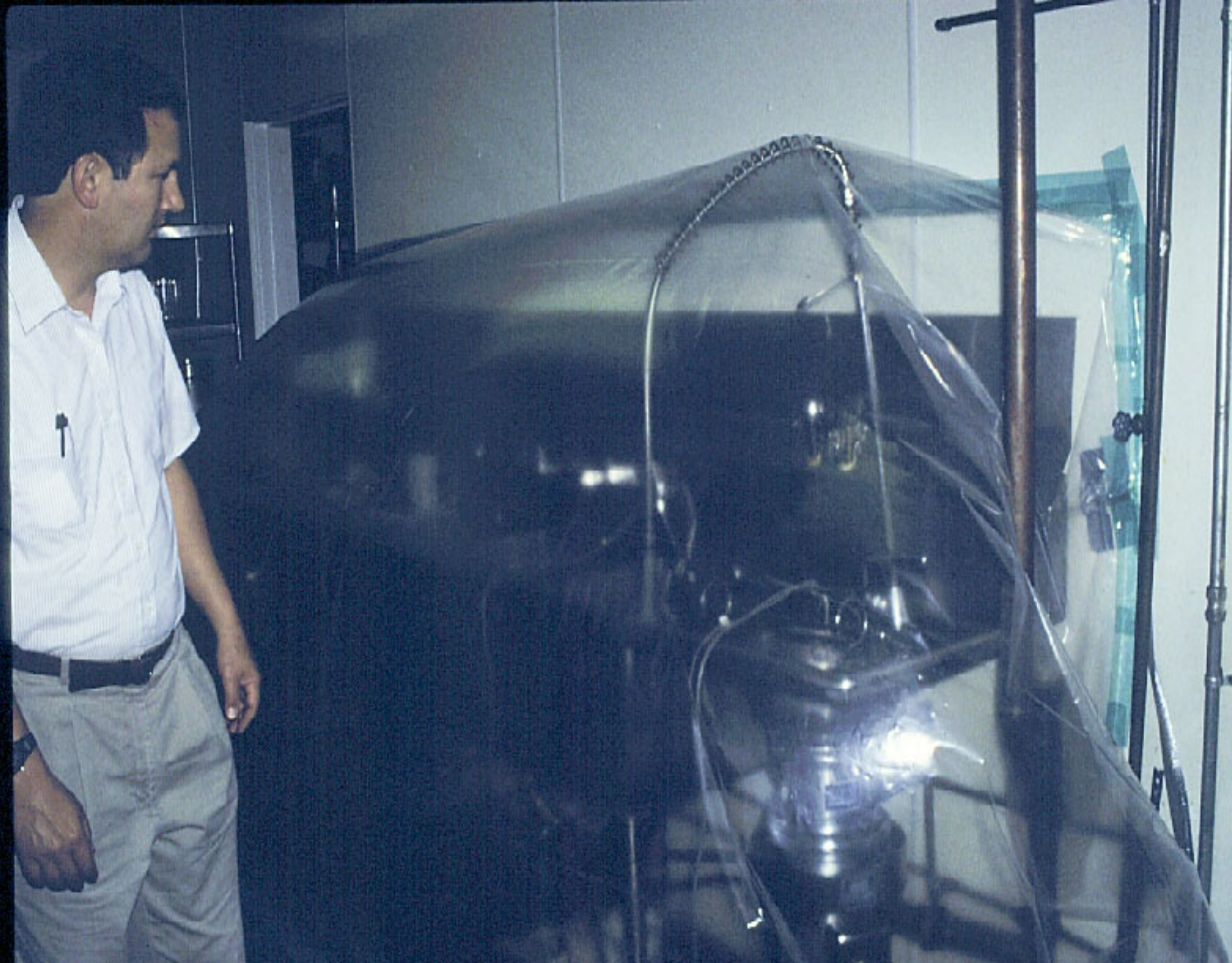


Contours 2 or greater
96% of population



Selective Equipment Heating





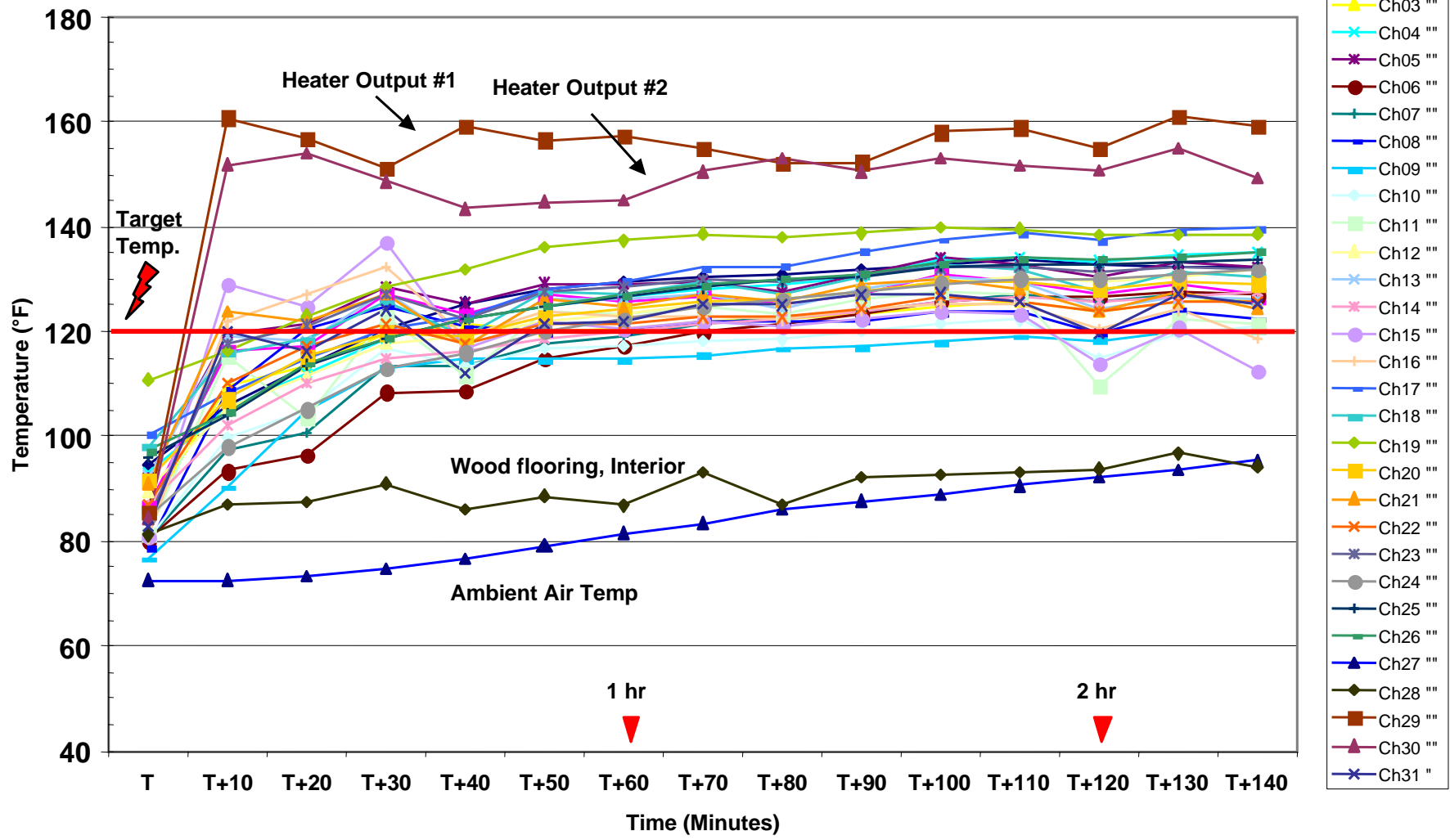
A photograph showing a large pile of snail shells, likely from a collection or a field site. The shells are mostly brown and tan with spiral patterns. An arrow points from the text above to a specific shell in the pile. The shells are scattered on a light-colored, possibly concrete or stone, surface. The text is overlaid on the image in white font.

Exotic Turkish land snail
(*Monaca syriaca*)

Native land snail
(*Succinea camestris*)



Treatment Trial No. 1: Temperature Profile for Snail Control Project, 20 Ft. Metal Military Shipping Container, Sunny Pt., NC, 11 May 2000.



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

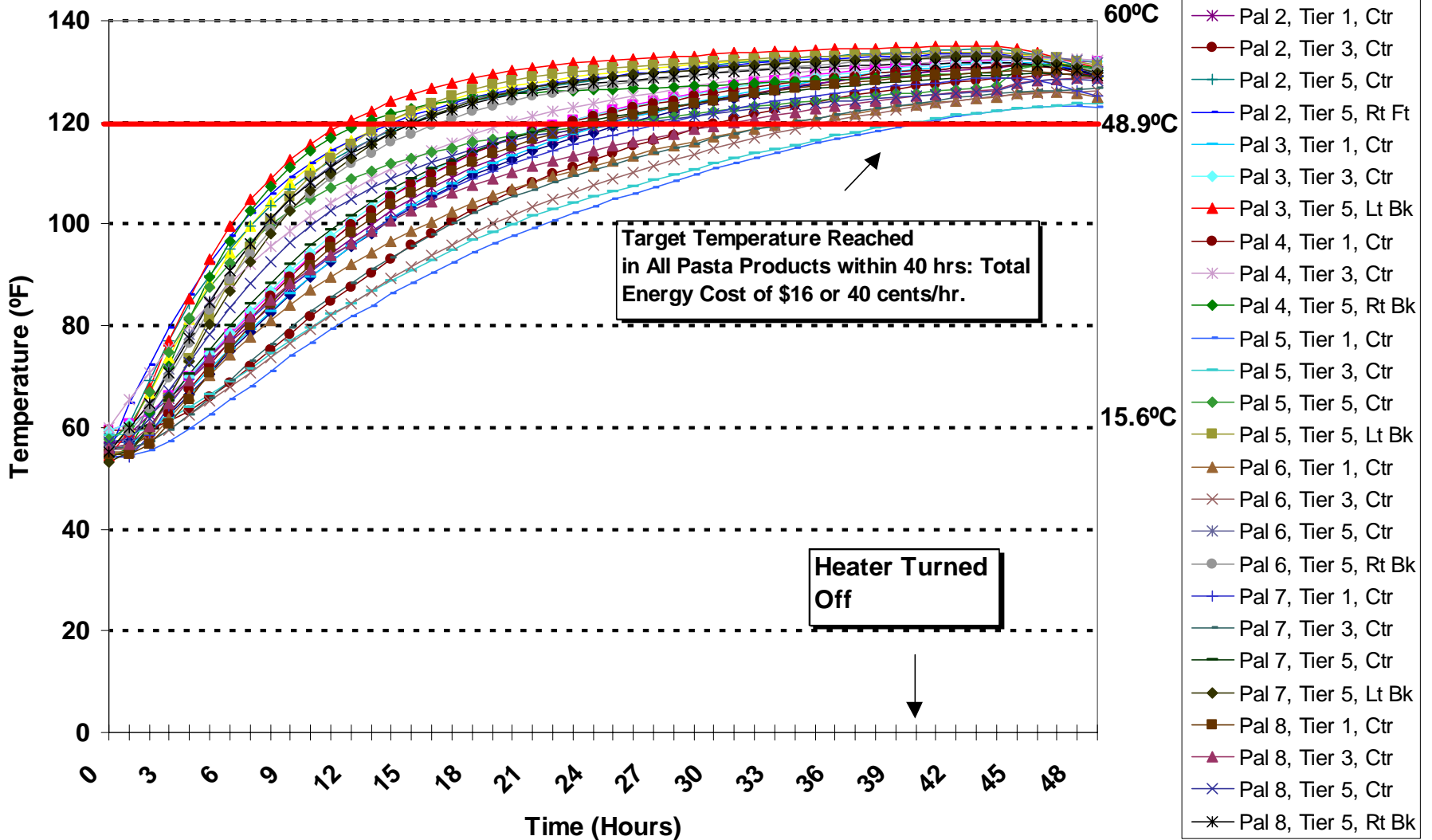


Cremetta
ELBOW MACARONI
Enriched

DANNA
3-2
DANNA



**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



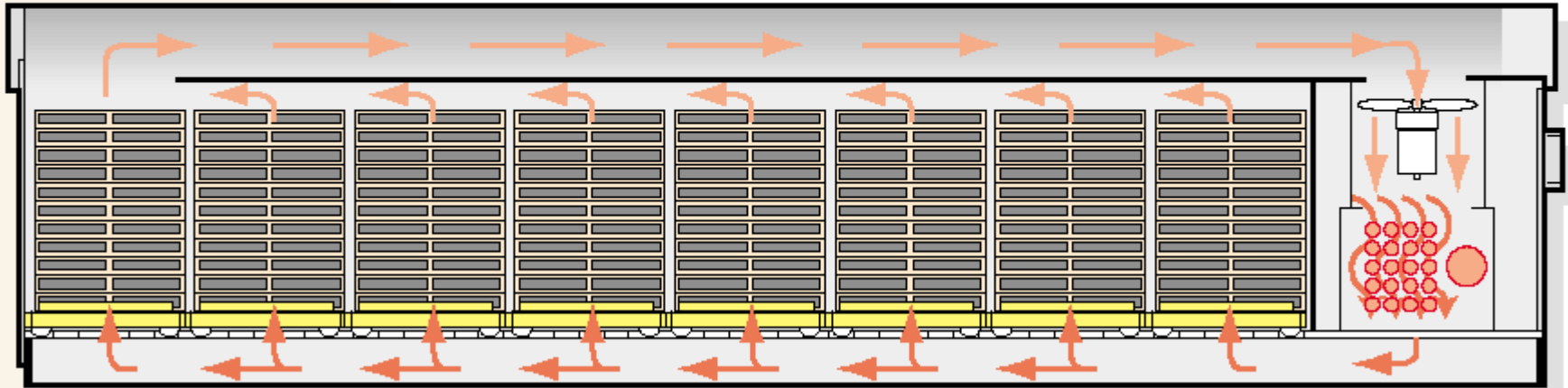
Whitespotted sawyer

A black and yellow forklift is positioned on the left, moving a pallet of lumber into a large, silver, industrial thermal pest management chamber. 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-HEATTM
Thermal Pest Management Systems



**CAUTION
HOT**



DLA USAGE TO DATE

- Chamber at DDC East and West,
- Oct 01 – Nov 03
- 600 loads
 - average of 3,100 board feet per load
 - 1.86 million board feet treated
- Replacement cost
 - Average of \$0.75 per board foot
 - \$ 1.3 million in wood alone

Fumigation

- Only methyl bromide approved
 - Vikane® data to be submitted this spring
- Methyl bromide
 - Schedule
 - 3 lbs per 1,000 ft³ for 16 hours > 70° F
 - 4 lbs at 50° to 70° F
 - 4,680 lbs of methyl bromide saved to date
 - At 3 lb rate 7.8 lbs per load x 600
 - If half the year below 70° F then 5,460 lbs saved

Cost Estimate

Heat Versus Fumigation

- | | |
|---|--|
| <ul style="list-style-type: none">• \$70,000 – 2 thermal chambers• \$9,000 – energy cost, 600 x \$15 <hr/> | <ul style="list-style-type: none">• \$12,000 – 4, 40 foot Containers• \$120,000 – contract fumigator, 600 x \$200 <hr/> |
| <ul style="list-style-type: none">• \$80,000 | <ul style="list-style-type: none">• \$132,000 |

Heat for PWN Control

- Simple and convenient

- in-house staff

- 3 runs a day, for 3 days

- Safe

- Energy efficient

- 100% energy efficient

- 100% energy efficient

- 100% energy efficient

- Meets international standards

- Additional information: <http://pestheat.com>

- 180 to 600 pallet capacity

Heat - The Eloquent Solution

THERMAL PEST CONTROL

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