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# ALTERNATIVES TO GENERAL FUMIGATION

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**PAT PLUMER**

**FOOD PROTECTION SERVICES**

July 27, 2018



# Fogging & Spot Fumigation



# Fogging & Spot Fumigation

## ▲ What is Fogging?

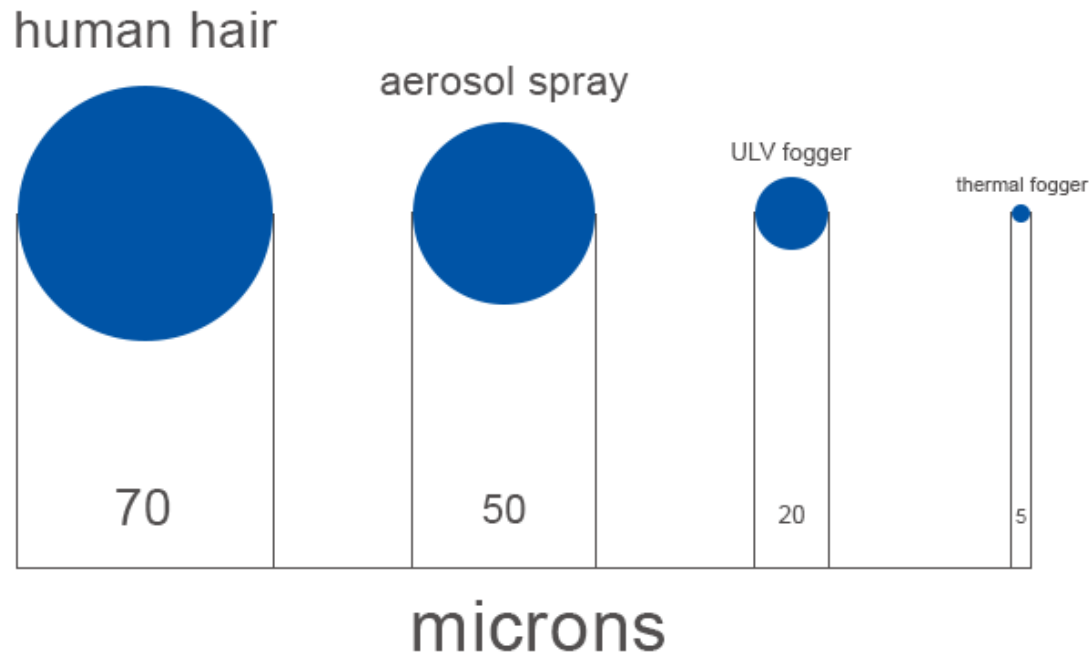
- Use of a pesticide in ULV form.
- Used to keep insect levels manageable.
- Primarily used with a contact insecticide.
- Must be a supplement to **proper sanitation**, crack and crevice, and spot fumigation.
- Best at times to maintain a routine fogging schedule



# Fogging & Spot Fumigation

## ▲ Ultra Low Volume

- Liquid pesticide in the form of micron-sized droplets
  - Uses large volumes of air at low pressure to create droplets.
  - Typically 1-150 microns.



# Fogging & Spot Fumigation

## ▲ What a Fogging is not...

### ...A Fumigant

- Liquid form, not a gas
- Less effective.
- Less expensive.
- Residue issues.
- Not a “One size fits all” solution



# Types of Fogging



## Cold Fog

Use for Pyrethrin, Conquer,  
Vapona and IGRs

Motor and nozzle designed to  
pressurize low volumes of air



## Thermal Fog

Use for Pyrethrin Only

Uses heat to vaporize

Not for IGRs or Conquer

Not recommended for Vapona

# Type of Fogging

## ▲ Type of Foggers

- Electric
- Cylinderized
- Thermal
- Portable
- Fixed



# Types of Foggers

## ▲ Electric

- Cold Fog
- Somewhat portable
- Adjustable droplet size
- 1(+) gallon capacity

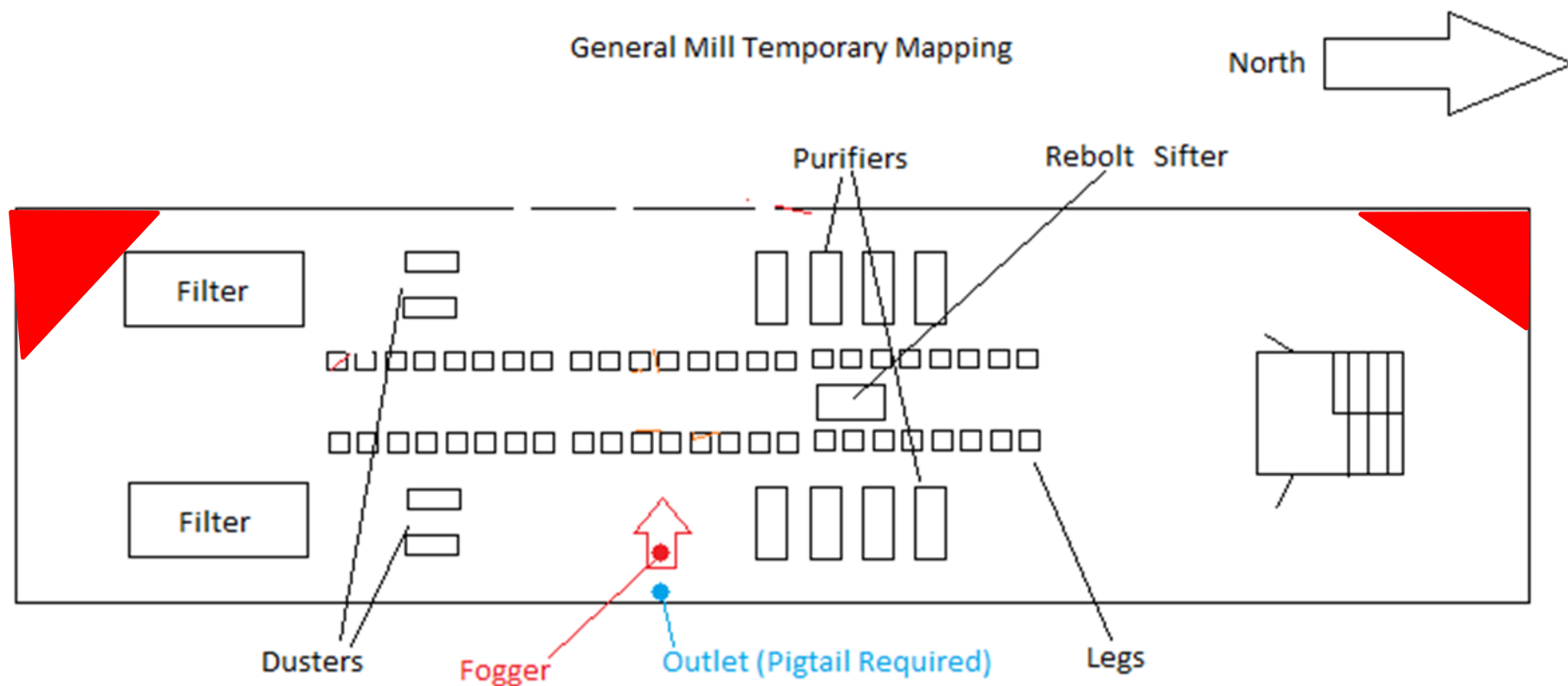
### *Cons*

- Require energy source
- Fogger can overheat
- Dispersion issues



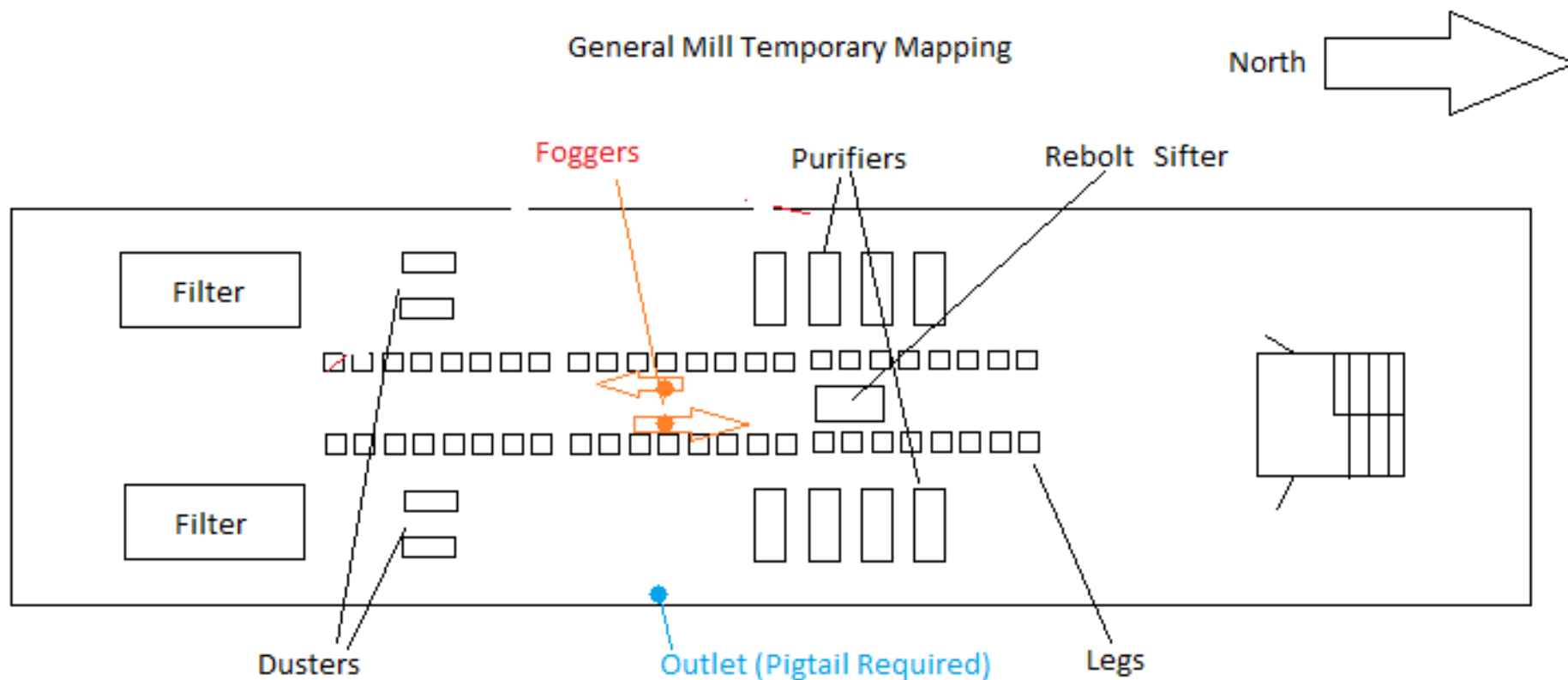
# Types of Foggers

## Electric



# Types of Foggers

## Electric



# Types of Foggers

## ▲ Cylinderized

- Cold Fog
- Pressurized with CO<sub>2</sub> – good dispersion
- No energy source needed

### *Cons*

- More expensive
- Difficult to build inventory

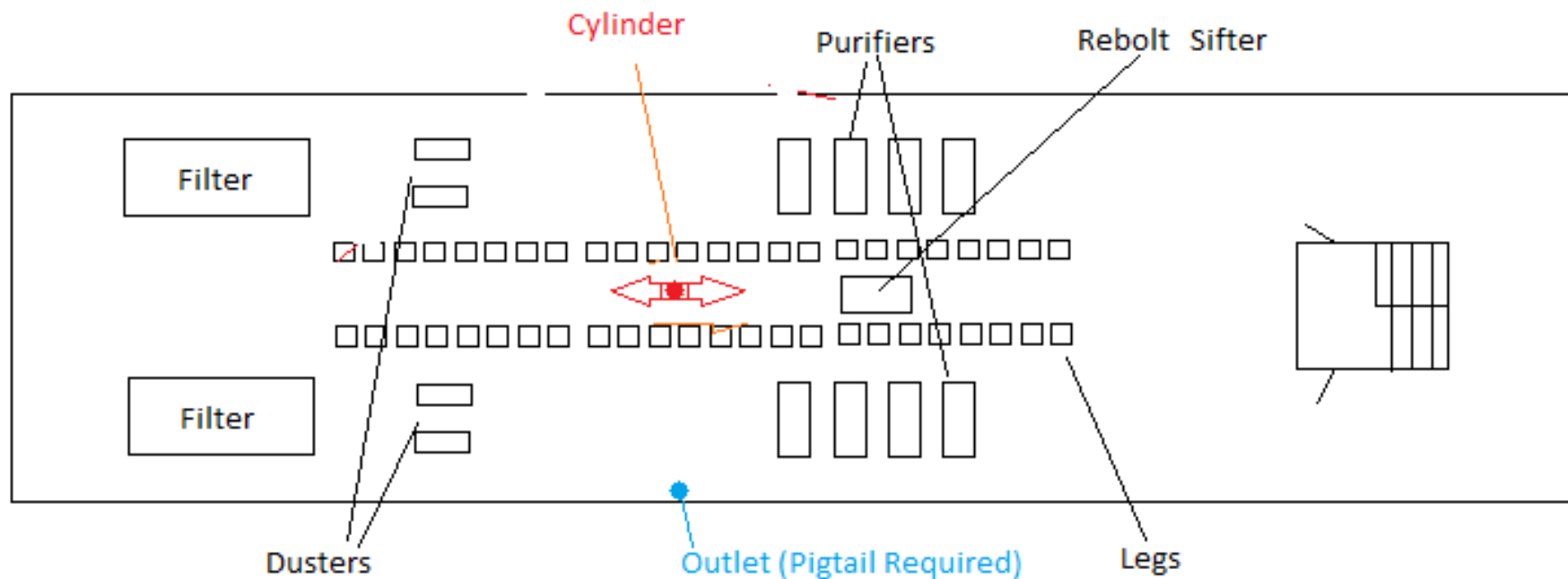
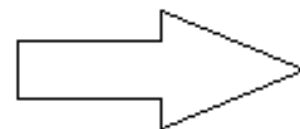


# Types of Foggers

## Cylinderized

General Mill Temporary Mapping

North



# Types of Foggers

## ▲ Thermal

- Hot fog
- Portable
- Smaller droplets (<50 Microns)

### *Cons*

- Fire / Explosion concerns
- Pyrethrins only
- Applicator exposure



# Types of Foggers

## ▲ Portable

- Portable
- Use in large or congested areas

### *Cons*

- Applicator exposure
- Efficacy
- Fire/Explosion Concerns



# Before you Fog

*Start with the insect first!*



# Before you Fog

*Start with the insect first!*

## ULD® BP-100 Contact Insecticide II

locations (including around equipment, appliances and pallets, if desired) contacting as many insects as possible. Do not remain in treated areas after application. Keep area closed for at least 1 hr. Open and thoroughly ventilate treated areas before reoccupying. Do not apply as a space spray in residences.

**DILUTION:** Use a white mineral oil conforming to regulation 21 CFR 178.3620(b) or an odorless light petroleum hydrocarbon conforming to 21 CFR 172.882 or 40 CFR 180.910 (inert ingredients used pre and post-harvest; exemptions from the requirement of a tolerance) and 180.930 (inert ingredients applied to animals; exemptions from the requirement of a tolerance.) Combine oil and concentrate as directed below and mix well just prior to application.

Pyrethrin % Desired	Mixture Rate	Application Rate/1,000 ft <sup>3</sup>
0.50	1 Part Conc. to 1 Parts Oil	1 fl oz
0.30	1 Part Conc. to 7 Parts Oil	1 - 2 fl oz
0.15	1 Part Conc. to 17 Parts Oil	1 - 2 fl oz

**SPACE SPRAY – CRAWLING INSECTS (Ants, Bed Bugs, Beetles, Earwigs, Cockroaches, Silverfish, Spiders):** Use full strength. Prior to treatment, open cabinets, doors and equipment to be treated; turn off air conditioners and fans, extinguish all flames and close windows in the area to be treated. Apply as a space spray using a mechanical aerosol generator (no droplets >50 microns in diameter and 80% <30 microns) at a rate of approx. 1 fl oz/1,000 ft<sup>3</sup> of room space. In commercial operations, subtract the space occupied by stored product or equipment from the cubic footage. Disperse toward areas suspected of harboring the greatest infestations of listed pests. Disperse in all locations (including around equipment, appliances and pallets, if desired) contacting as many insects as possible. Do not remain in treated area after application and leave area closed for 1 hr. Ventilate thoroughly before occupants are allowed to reenter. Do not apply as a space spray in residences.

**DIRECT SPRAY OR VOID TREATMENTS:** Use equipment designed space or mist treatments. Follow the manufacturer's recommendations for proper equipment set up and operation. Place the tip of the applicator at or into the crack or crevice or opening to the void. Apply in short bursts into area being treated. Apply 1 sec of product for every 3 ft<sup>3</sup> of void area. **For Direct Spray**, apply the product in short bursts into the area where insects are to be contacted, such as corners of the room, behind and under furniture or other equipment. Apply from a distance of 18 - 24" away from the surface and allow the material to drift to area to be treated. The

tank in a weather protected area or plastic sleeve. The dilution statement must be phrased as follows: this container holds \_\_\_\_ parts [product name] to \_\_\_\_ parts water.

- If used in a direct injection system, the pesticide container must be locked. Securely attach the end use label to the pesticide container in a weather protected area or plastic sleeve.
- This product must only be used in systems that have been calibrated to apply no more than the maximum application rate of 0.0033 lbs/1,000ft<sup>3</sup> (no animals present).

## STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal. **PESTICIDE STORAGE:** Store in original container in secured, dry storage area. Do not store above 100°F for extended periods of time. Storage below 32°F may cause freezing. If container is damaged or spill occurs, use product immediately or dispose of product and damaged container as indicated below.

**PESTICIDE DISPOSAL:** Wastes resulting from the use of this product may be disposed of on site, in accordance with the label directions, or at an approved waste disposal facility.

**CONTAINER DISPOSAL:** Nonrefillable container. Do not reuse or refill this container! Empty container by using the product according to the label directions. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows:

**≤ 5 gal:** Empty the remaining contents into application equipment or a mix tank and drain for 10 sec after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 sec. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 sec after the flow begins to drip. Repeat this procedure 2 more times.

**> 5 gal:** Empty remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 sec. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure 2 more times.

Then offer for recycling, if available, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned stay out of smoke.

In addition to sites listed previously, this product is acceptable

This product is also effective against the following insects when used according to label directions:

### FLYING INSECTS:

Bees  
Blow Flies  
Bottle Flies  
Cheese Skippers  
Deer Flies  
Flies  
Fungus Gnats  
House Flies  
Hornets  
Mushroom Flies  
Stable Flies  
Vinegar Flies  
Yellowjackets

### CRAWLING INSECTS:

Bed Bugs  
Book Lice  
Cabbage Loopers  
Cabbages Worms  
Cockroaches  
Crickets  
Fire Ant Workers  
Firebrats  
Millipedes  
Pillbugs  
Sowbugs  
Scorpions

### GRAIN BORERS:

Larger Grain Borers  
Lesser Grain Borers

### FLEAS & TICKS:

Brown Dog Ticks  
Fleas  
Ticks

### LICE:

Cattle Lice

### SPIDERS & MITES:

Cheese Mites  
Clover Mites  
Grain Mites  
Mites  
Spiders

### WEEVILS:

Bean Weevils  
Granary Weevils  
Maize Weevils  
Rice Weevils

### MOTHS:

Almond Moths  
Chocolate Moths  
Clothes Moths  
Cocoa Bean Moths  
Mediterranean Flour Moths

### WORMS:

Dark Mealworms  
Lesser Mealworms  
Yellow Mealworms

### BETTERLES:

Black Carpet Beetles  
Carpet Beetles  
Darkling Beetles  
Dermestid Beetles  
Dried Fruit Beetles  
Drugstore Beetles  
Flat Grain Beetles  
Foreign Grain Beetles  
Fungus Beetles  
Ground Beetles  
Hide Beetles  
Merchants Grain Beetles  
Mexican Grain Beetles  
Red Flour Beetles  
Red Horned Grain Beetles  
Rusty Grain Beetles  
Sawtoothed Grain Beetles  
Spider Beetles  
Trogoderma Beetles  
White Marked Spider Beetles

## MOTHS:

Almond Moths  
Chocolate Moths  
Clothes Moths  
Cocoa Bean Moths  
Mediterranean Flour Moths

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Sawtoothed Grain Beetles  
Spider Beetles  
Trogoderma Beetles  
White Marked Spider Beetles



**Food  
Protection  
Services**

# Before you Fog

*Start with the insect first!*



\*\*\*Fogging only targets active stages.\*\*\*

# Before you Fog

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## *Requirements for Re-entry*

*\*Difference chemicals require different re-entry periods.*

### ▲ Conquer, Kicker, Gentrol

- Keep area closed for 30 min after application
- “Ventilate thoroughly before re-entry.”

### ▲ Pyrethrin

- Keep area closed for 1 hour after applications
- “Ventilate thoroughly before re-entry.”

### ▲ Vapona DDVP

- No entry w/o PPE for 24 hours
- OR - Use of detection tubes to determine presence of Vapona

# Before you Fog

## *Considerations for Success*

- ▲ Is facility in good sanitation condition?
- ▲ Is a crack & crevice spot fumigation necessary?
- ▲ Are food and food surfaces removed / covered?
- ▲ How much time is available?



# Fogging & Spot Fumigation

## Spot Fumigation



# Spot Fumigation

## *What is a Spot Fumigation?*

- ▶ “Short term treatment of equipment for control of the adult and larval life stages of insects.”
- ▶ “Intended to interrupt life cycles”
- ▶ Must be repeated periodically to control infestation



# Spot Fumigation

## *What is a Spot Fumigation?*

- ▲ Used to manage insect activity where fogging / spraying cannot be used
  - Inside food processing equipment
  - Grain transfer systems



# Spot Fumigation

## Fumigant Options

- ▲ Magtoxin Spot Fumigant
- ▲ Fumi-Cel
- ▲ ProFume



**RESTRICTED USE PESTICIDE**  
**DUE TO HIGH ACUTE INHALATION TOXICITY OF PHOSPHINE GAS FOR RETAIL SALE TO DEALERS AND CERTIFIED APPLICATORS ONLY. FOR USE BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION, AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION. REFER TO THE DIRECTIONS IN THIS APPLICATOR'S MANUAL FOR REQUIREMENTS OF THE PHYSICAL PRESENCE OF A CERTIFIED APPLICATOR.**

THE COMPLETE LABEL FOR THIS PRODUCT CONSISTS OF THE CONTAINER LABEL AND THE APPLICATOR'S MANUAL WHICH MUST ACCOMPANY THE PRODUCT. READ AND UNDERSTAND THE ENTIRE CONTAINER LABEL AND APPLICATOR'S MANUAL.

A FUMIGATION MANAGEMENT PLAN MUST BE WRITTEN FOR ALL FUMIGATIONS PRIOR TO ACTUAL TREATMENT.

CONSULT WITH YOUR STATE LEAD PESTICIDE REGULATORY AGENCY TO DETERMINE REGULATORY STATUS, REQUIREMENTS, AND RESTRICTIONS FOR FUMIGATION USE IN THAT STATE. CALL 540-234-9281/1-800-330-2525 IF YOU HAVE ANY QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABELING.

### APPLICATOR'S MANUAL FOR

 **MAGTOXIN®**

**PREPAC SPOT FUMIGANT**  
Patent No. 4653644

FOR SPOT TREATMENT OF FOOD AND FEED PROCESSING  
MACHINERY AND EQUIPMENT

Active Ingredient: Magnesium Phosphide ..... 66%  
Inert Ingredients: ..... 34%  
Total ..... 100.0%



**KEEP OUT OF REACH OF CHILDREN**  
**DANGER - POISON - PELIGRO**



**FOR BURROWING RODENT APPLICATIONS: THE USE OF THIS PRODUCT IS STRICTLY PROHIBITED WITHIN 100 FEET OF ANY BUILDING WHERE HUMANS AND/OR DOMESTIC ANIMALS DO OR MAY RESIDE, ON SINGLE AND MULTI-FAMILY RESIDENTIAL PROPERTIES AND NURSING HOMES, SCHOOLS (EXCEPT ATHLETIC FIELDS), DAYCARE FACILITIES AND HOSPITALS.**

**PRECAUCION AL USUARIO:** Si usted no puede leer ingles, no use este producto hasta que el marbete le haya sido completamente explicado.

**(TO THE USER:** If you cannot read English, do not use this product until the label has been fully explained to you.)

Manufactured for:

**D & D HOLDINGS, INC.**  
P. O. Box 116  
153 Triangle Drive  
Weyers Cave, VA 24486 USA  
Telephone: (540)234-9281/1-800-330-2525  
Fax: (540)234-8225  
Internet: [www.degeschamerica.com](http://www.degeschamerica.com)  
E-mail: [degesch@degeschamerica.com](mailto:degesch@degeschamerica.com)  
EPA Est. Nos. 40285-VA-001; 40285-VA-002;  
40285-OR-001; 40285-LA-001; 36301-TX-001  
EPA Reg. No. 72959-7

Form #18519 (R 8/2013)

# Spot Fumigation

## Fumigant Options

### ▲ Magtoxin

- Magnesium Phosphide pellets in a dimple “spot”
- Fastest reacting metal phosphide on market.

#### *Cons*

- Retrieval
- Fire concerns
  - Over application
  - Moisture



# Spot Fumigation

## Fumigant Options

### ▲ Fumi-Cel

- Magnesium Phosphide “Cel”
- Not as fast as Spot Fumigant

#### *Cons*

- Retrieval
  - Over application
  - Moisture
  - Falling Over
- Cels not designed to be placed equipment along



# Spot Fumigation

## Fumigant Options

### ▲ ProFume (Pulse System™)

- Sulfuryl Flouride
- Non corrosive to electronics
- No resistance concerns
- No retrieval concerns



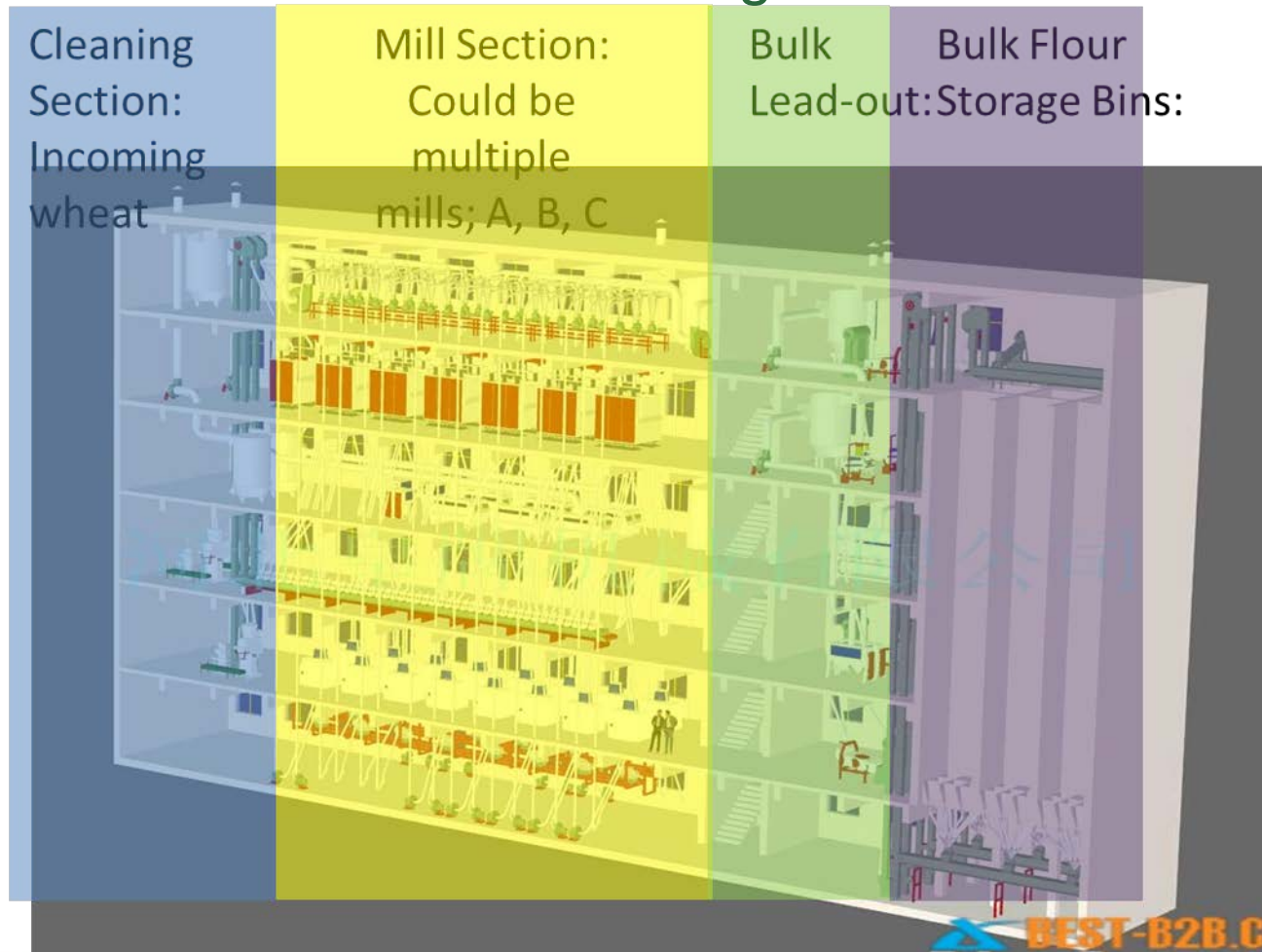
# Spot Fumigation

## What to Fumigate



# Spot Fumigation

## What to Fumigate



# Spot Fumigation

## What to Fumigate

M6 = Dusters, Dust Collection

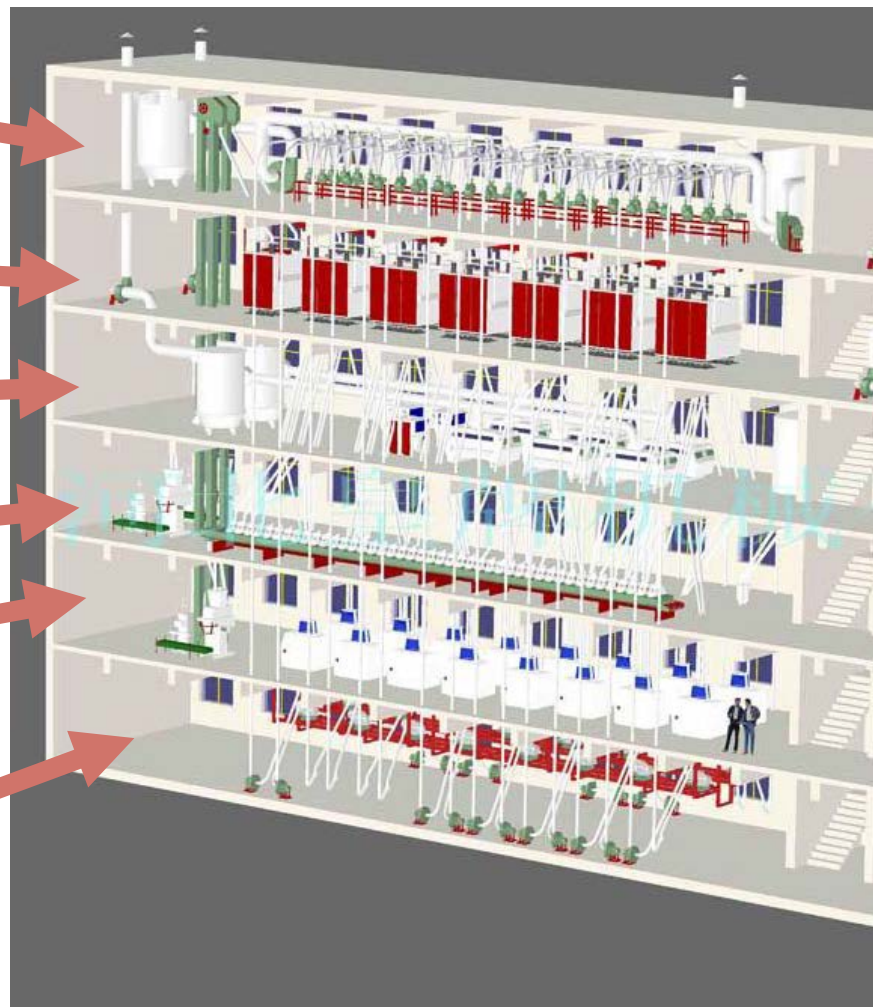
M5 = Sifters

M4 = Purifiers or Sifters

M3 = Conveyors or Sifters

M2 = Roll Stands

M1 = Hoppers and Lifts  
or bucket elevators



# What to Fumigate

## Dust Collectors

- ▲ Different shapes and Sizes
- ▲ Can have separate compartments
  - Must be individually treated



# What to Fumigate

## Sifters

- ▲ Typically reblot, 4, or 6 boxes
  - Each must be treated separately
- ▲ Spots can be hung in 'elbows'
- ▲ No sealing required



# What to Fumigate

## Purifiers

- ▲ Requires Tarping



# What to Fumigate

## Dusters

- ▀ Typically a vent on top that requires sealing



# What to Fumigate

## Screw Conveyors

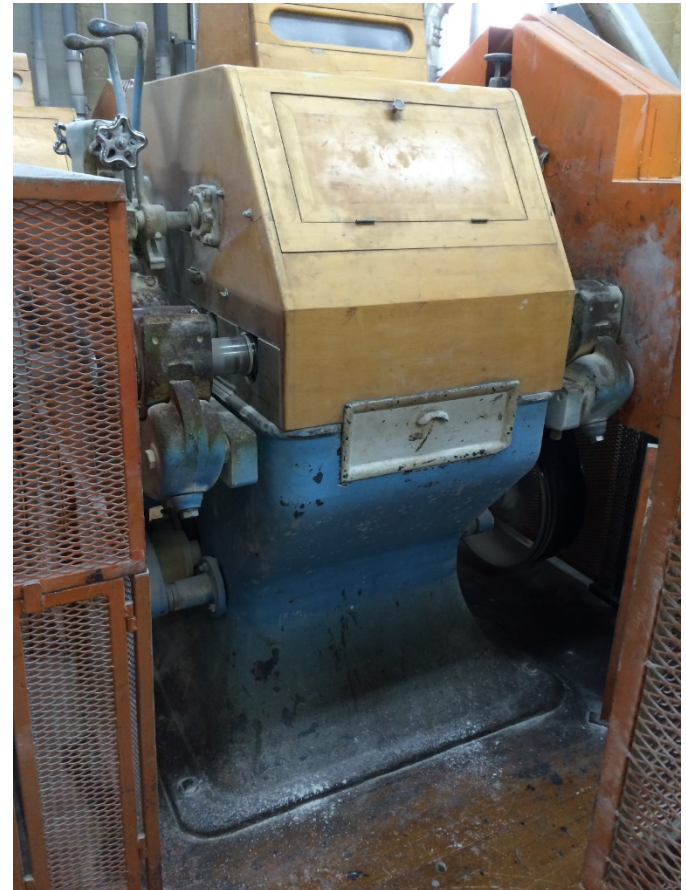
- ▲ Sealing not required



# What to Fumigate

## Roll Stands

- ▲ Each side is separate, requires treatment of each side.



# What to Fumigate

SPOT FUMIGANT - FOG ACCOUNTABILITY				Date Placed:		Sealing:		
Customer:				Date Removed:				
Area Treated:				Date: Disposed:				
				Total Number of SPOT Packs Placed				
	Type	# Units	# in Each	PLANNED	PLACED	REMOVED	OUTSIDE	Comments:
Dust Collector	Large							
	Medium							
	Small							
Hopper								
Duster								
Roll Stand								
Sifter	6 Box							
	4 Box							
	Rebolt							
Conveyor								
Elevator Leg								
Other								
	Foggers							
	Chemical Containers							
TOTAL								<b>Total Brought:</b>

# What to Fumigate

## Accountability!

- ▲ Securing Spots
- ▲ Recommend using bailing wire
- ▲ Place emphasis on securing wire before placing spot
- ▲ Place flagging on equipment and bailing wire



# After Treatment

## Ventilation

- ▲ Prior to treatment, identify all fans, filters, dust collection that can be used to ventilate
  - Do not turn on until after all spots are retrieved.



# After Treatment

## What can go Wrong?

- ▲ Health Hazards
- ▲ Failure to retrieve
  - Product contamination
  - Product recall
  - Loss of business
- ▲ Fire
  - Over application
  - Moisture





# Pulse Fumigation System™

## Significant Challenges

- ▲ High flammability
- ▲ Releasing gas from inside a structure
- ▲ Maintaining efficacy
- ▲ Loosing fumigant in equipment / systems
- ▲ Corrosive to electronics



# Pulse Fumigation System™

## Significant Challenges

- ▲ Vapona - DDVP
  - Lower efficacy
  - Application Exposure
  - Residual – Organophosphate
  - Equipment and Reliability
  - Slow equilibrium
  - Noticeable odor



# Pulse Fumigation System™



# Pulse Fumigation System™

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## Pulse Fumigation System™: The simplest explanation

- You replace magnesium phosphide spot fumigation and fogging with one gas fumigant – Sulfuryl fluoride (ProFume®).
- You apply gas in equipment at higher concentration to achieve an improved kill rate in processing system.
- You pulse gas in equipment to maintain concentration over time.
- What leaks out into open space will result in an adult kill like a fogging.

# Pulse Fumigation System™



# Pulse Fumigation System™

## Significant Improvements

- ▶ Remote Application
- ▶ Non-flammable application
- ▶ No risk of losing fumigant in equipment
- ▶ Variable control of application
- ▶ Application for outside
- ▶ No liquid pesticides used
- ▶ Higher efficacy



# Pulse Fumigation System™

Safety & Efficacy is our GOAL

- ▲ Higher Efficacy
- ▲ Penetration
- ▲ System Saturation



# Pulse Fumigation System™



# Pulse Fumigation System™



# Pulse Fumigation System™



# Pulse Fumigation System™

Application performed safely outside

- ▲ Flow controllers
- ▲ Solenoid valves
- ▲ Percentage timers
- ▲ Shorter treatment times:
  - 36, 24, 12 hours



# Pulse Fumigation System™

Monitoring will guide higher performance

- ▲ One gas monitor
- ▲ Inside Equipment
- ▲ Open space
- ▲ Data collected remotely

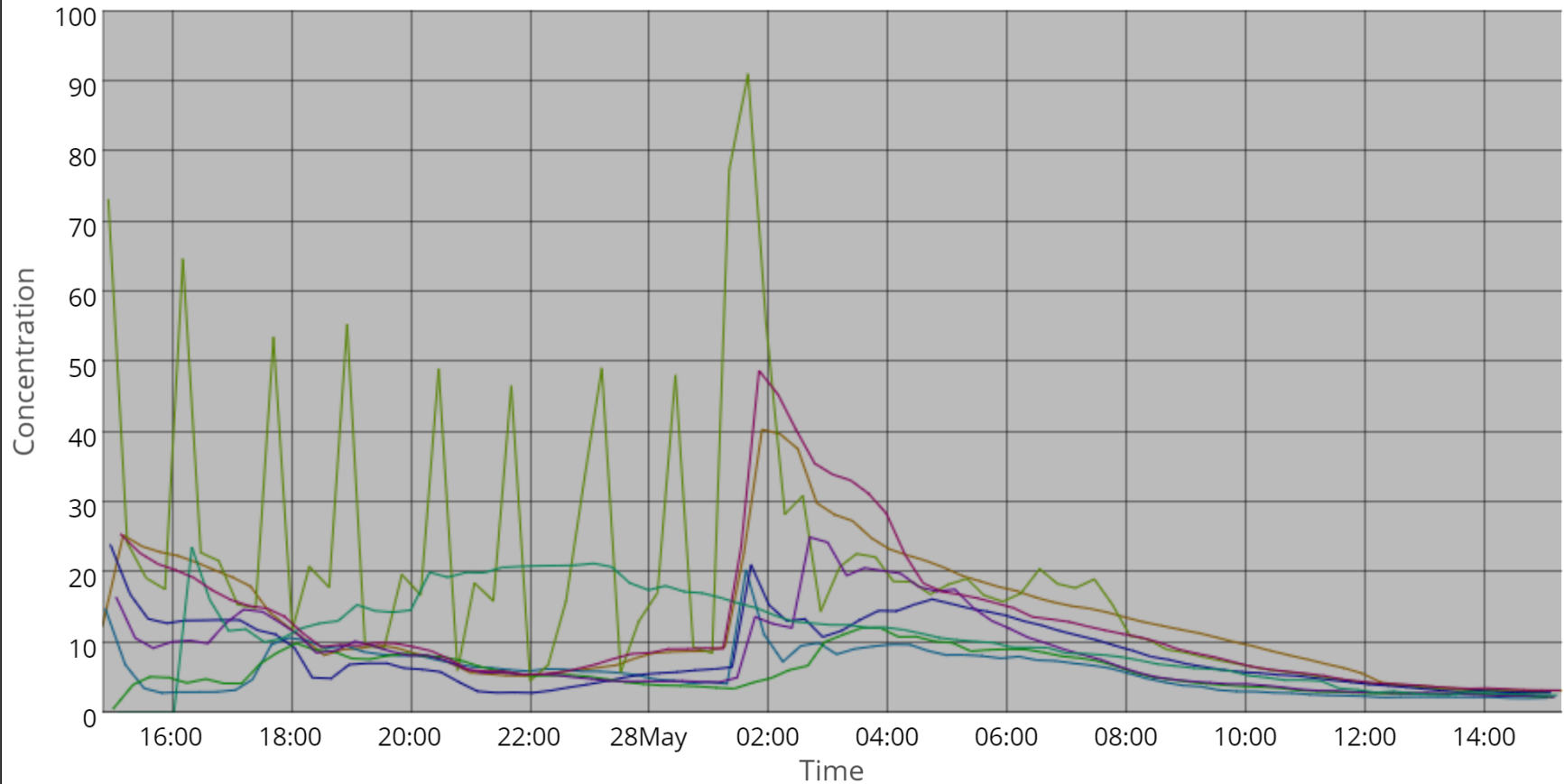


# Pulse Fumigation System™

Graph

PULSE FUMIGATION SYSTEM™

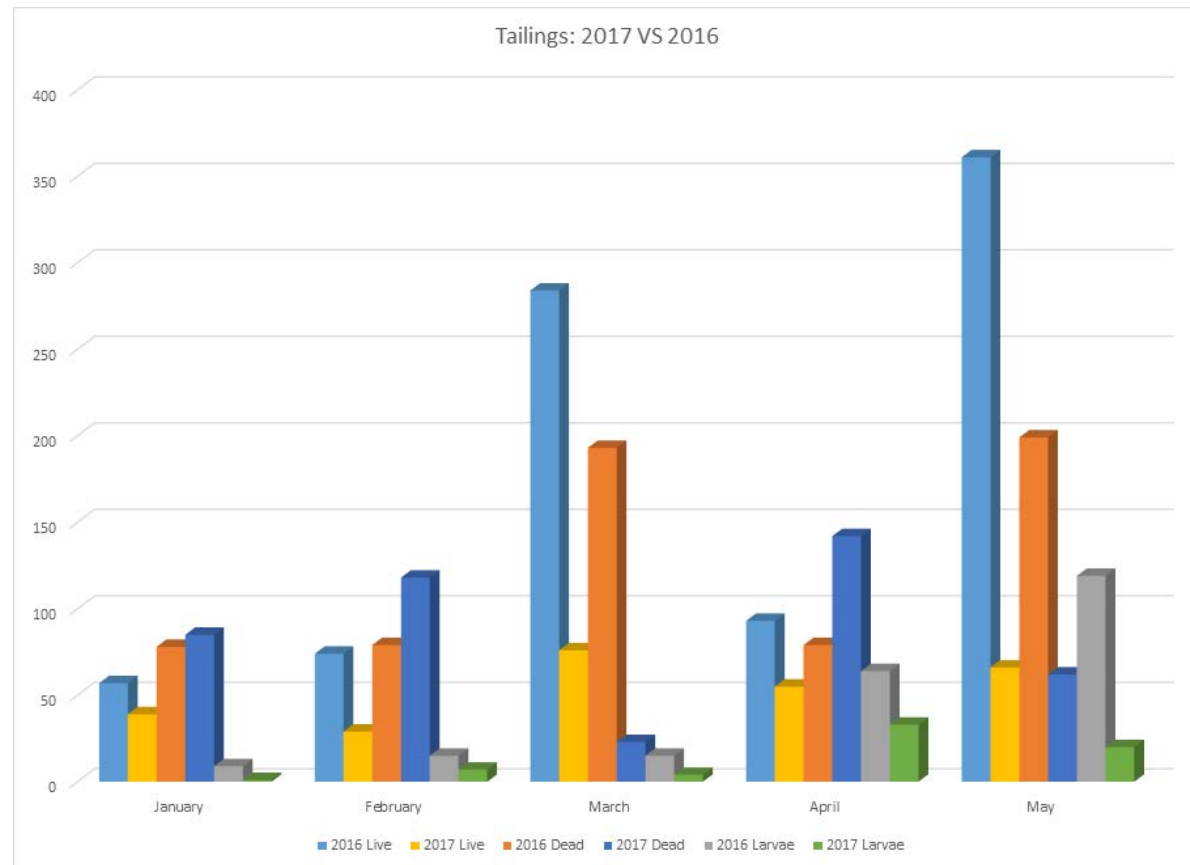
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# Pulse Fumigation System™

## Tailings Improvements

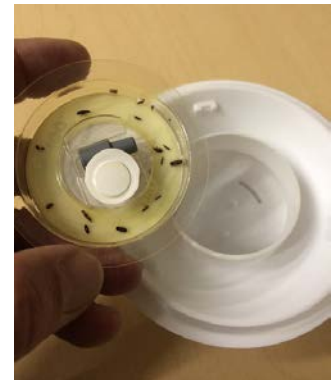
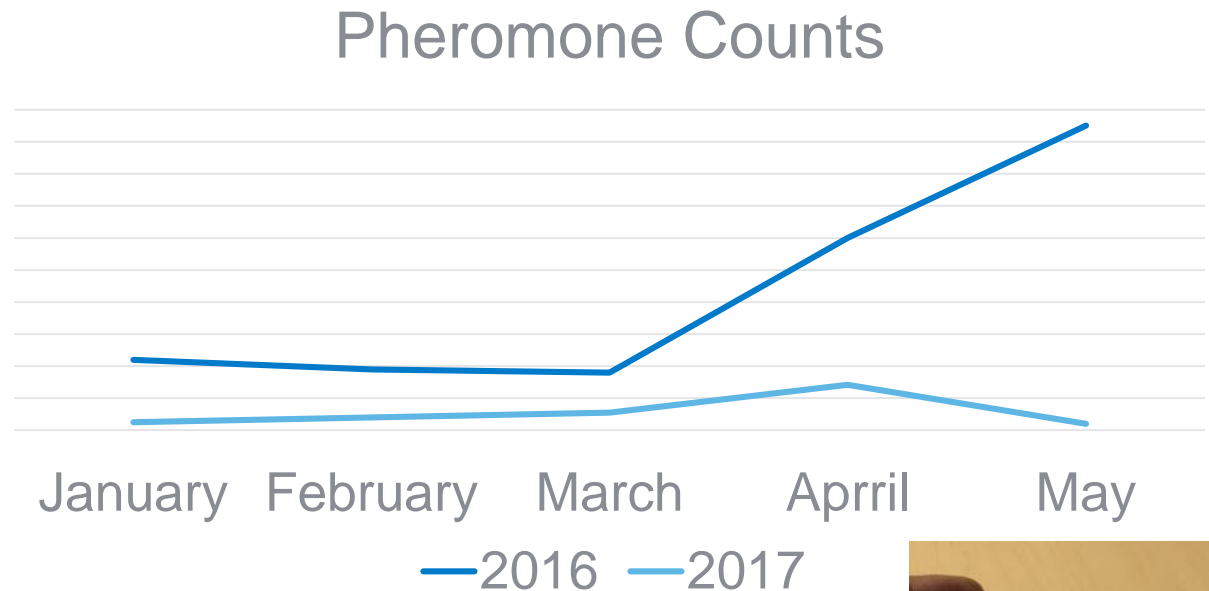
- ▲ 29% of 2016
- ▲ >3 fold reduction



# Pulse Fumigation System™

## Pheromone Counts

▲ Down Significantly



# Pulse Fumigation System™

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## Summary

1. Safety: Not in the fumigated area during application
2. Penetration
3. Higher Efficacy in equipment through pressurization
4. Non-flammable
5. Shorter treatment times (36 to 24 to 12)
6. Control over success of treatment
7. No disposal
8. Rodent efficacy rates
9. As milling equipment automates – SF is a none corrosive gas
10. Coast varies but is usually 20% higher



**Food  
Protection  
Services**

Pat Plumer  
Kansas City Operations Manager  
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**Food  
Protection  
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