



Pest Patrol: Killing Pests in Food Aid

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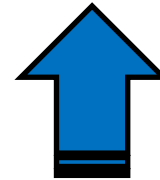
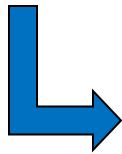
What is the problem?

Commodity losses due to insect infestation

Loss of weight, nutritional value and synergistic interaction with **mycotoxins**



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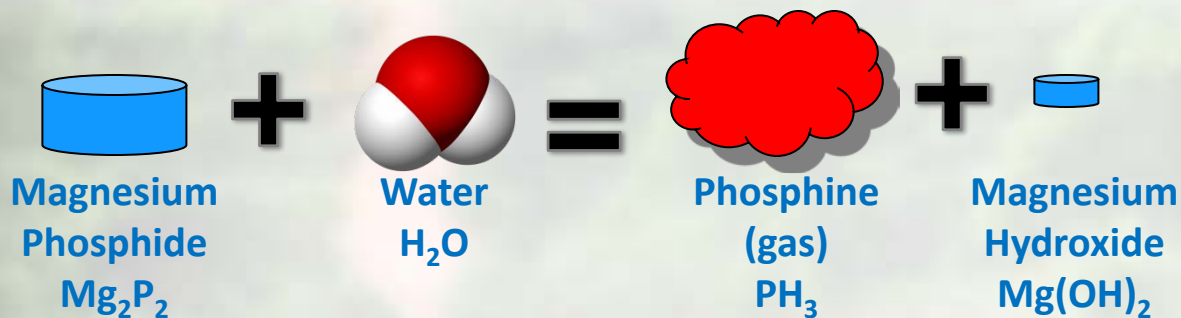
Food for Peace, Title II:

1-2 Million MT, ~\$1.7 B, ~50 Million people (FY10 & 11)



Fumigants Basics

Metal Phosphides (e.g., Tri-tox, Phostoxin, Quik-Fume)



Phosphine (gas):

- Restricted Use Pesticide – High acute toxicity, inhalation
- Colorless, fish/garlic odor
- Highly explosive, corrosive
- Chemical warfare



Safety & Efficacy Practices

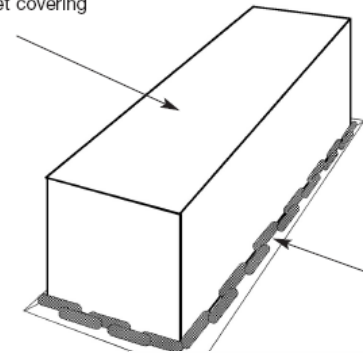
What Technology is Needed?

1. Appropriate PPE use and maintenance
2. Fumigation gas monitoring, efficacy and hazard
3. Gas impermeable tarps, sand snakes



Full-face respirator

Fumigation sheet covering the whole stack



Sand snakes holding the sheet to the ground and overlapping by at least 0.3m



Rehab symptoms match phosphine poisoning: Hospital

Jul 10th, 2012 by admin.

MUMBAI: Even as police officials and the Chougles deny that pest control was responsible for the deaths of Rameez and Rehab last week, the hospital that treated Rehab has verified that the victim and her family had offered this reason when they came for treatment.



Contractor Arrested for Culpable Homicide!

What Happened?

- Two siblings, Rameez and Rehab Chougles vomited blood, died of inflammation of lung
- House was treated with phosphine by an unlicensed fumigator
- Entered a fumigated space and turned on the air conditioning without opening windows
- **Only < 1 gram used**

What went wrong?

- No Markings indicating Fumigation
- Unlicensed Fumigator
- Obtained at a Local Chemical Store

Different Ways Fumigants Enter the Body

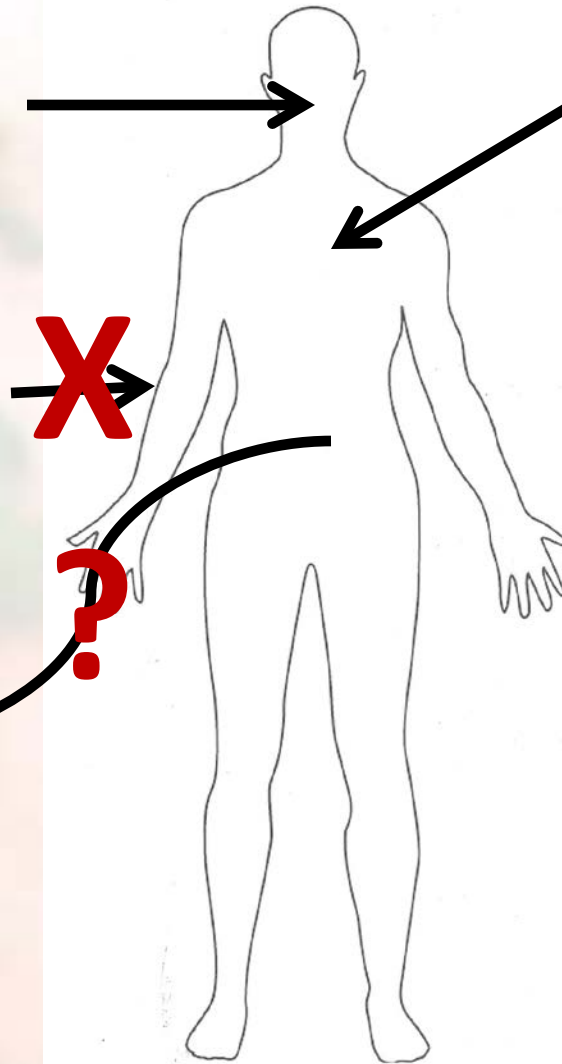
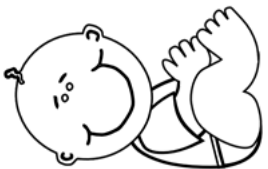
Mouth

Lungs

Skin

Phosphine
 PH_3

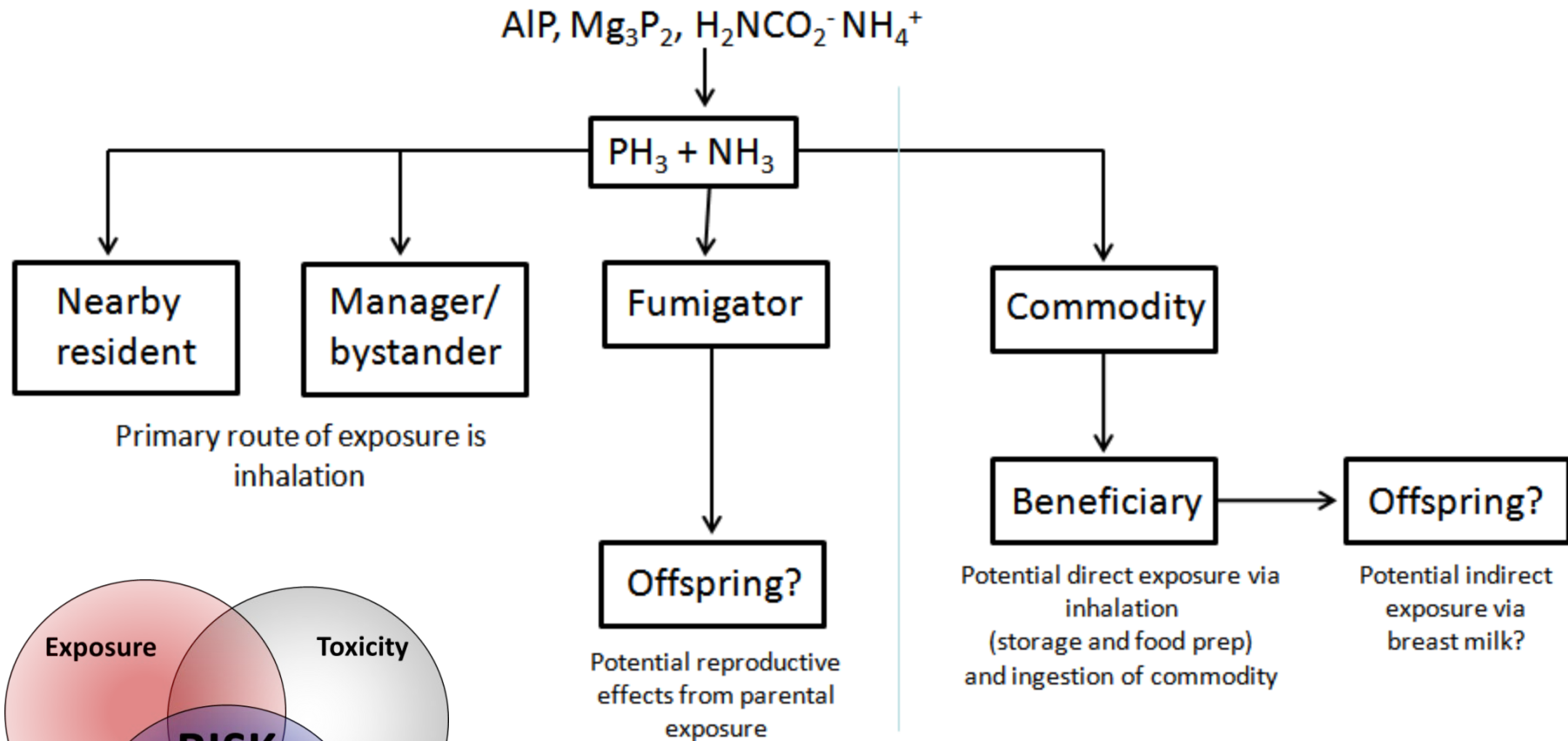
Pregnancy?



Primary ways each group may contact fumigants:

- Fumigation workers - inhalation
- Warehouse worker - inhalation
- Beneficiaries - ingesting fumigated food

Assessing Safety– Human Health Risk Assessment (HHRA)



Repeat application by fumigation providers, multiple acute exposure, chronic impacts?

What Safety Equipment Should our Fumigator be Wearing?

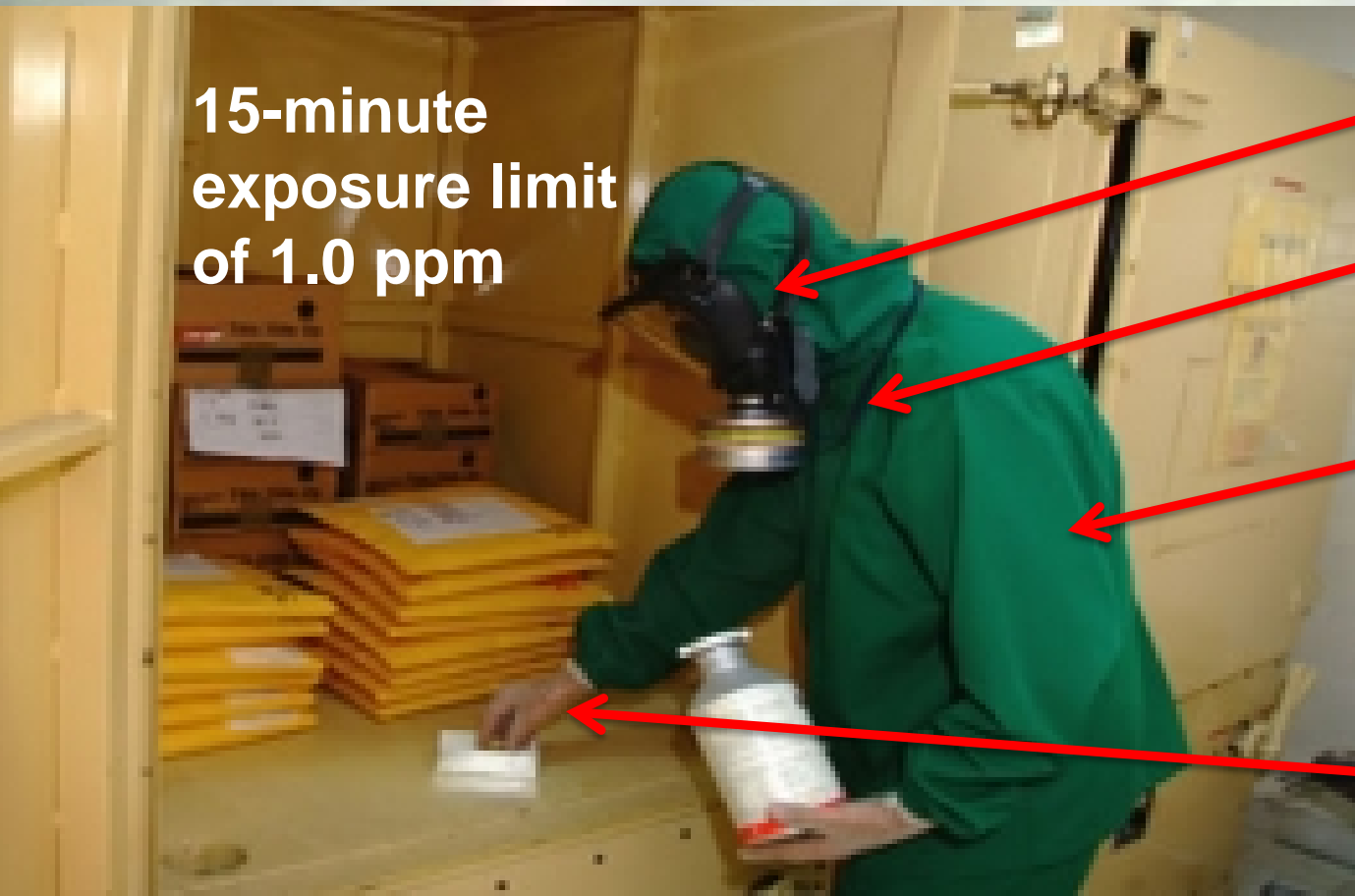
15-minute
exposure limit
of 1.0 ppm

Eye Protection

Respiratory
Protection

Coveralls

Clean Dry
Gloves



What Safety Equipment do Pesticide Applicators Often (not) Wear?



“Painters Mask” will not stop gas



- **No inhalation mask**
- **Bare feet and hands**

Efficacy: Risk of Pesticide Resistance

Like drug-resistant TB, target insects can become resistant to PH_3 ... No Viable Alternatives

Problem:

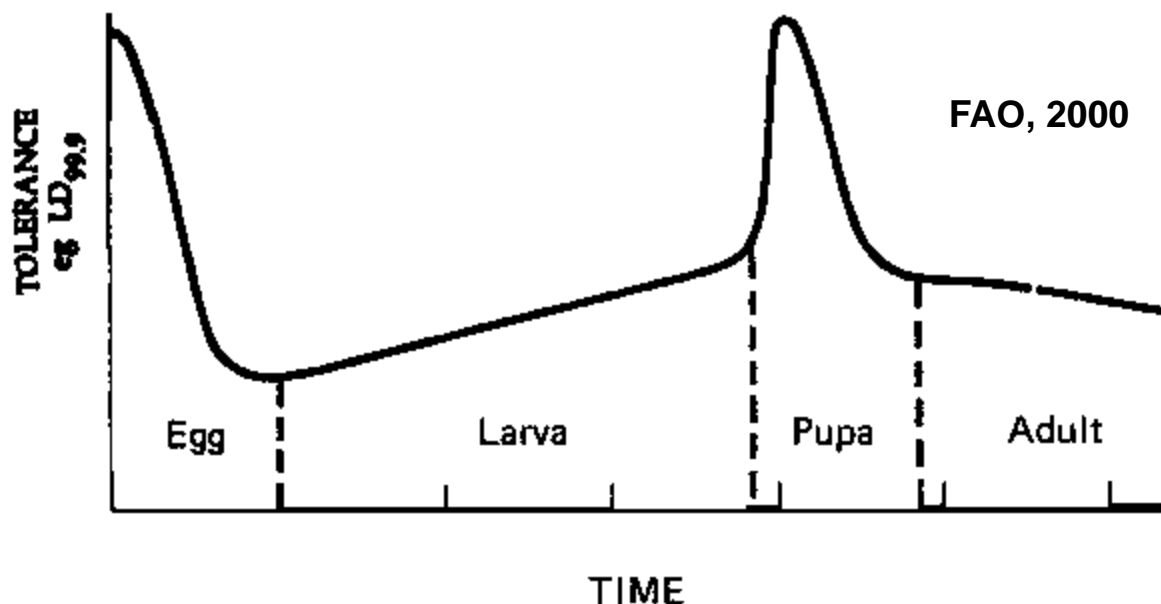
- Larvae and adult insects effectively
- Not, egg and pupal stages

Solution:

- Higher concentrations
- Longer exposure

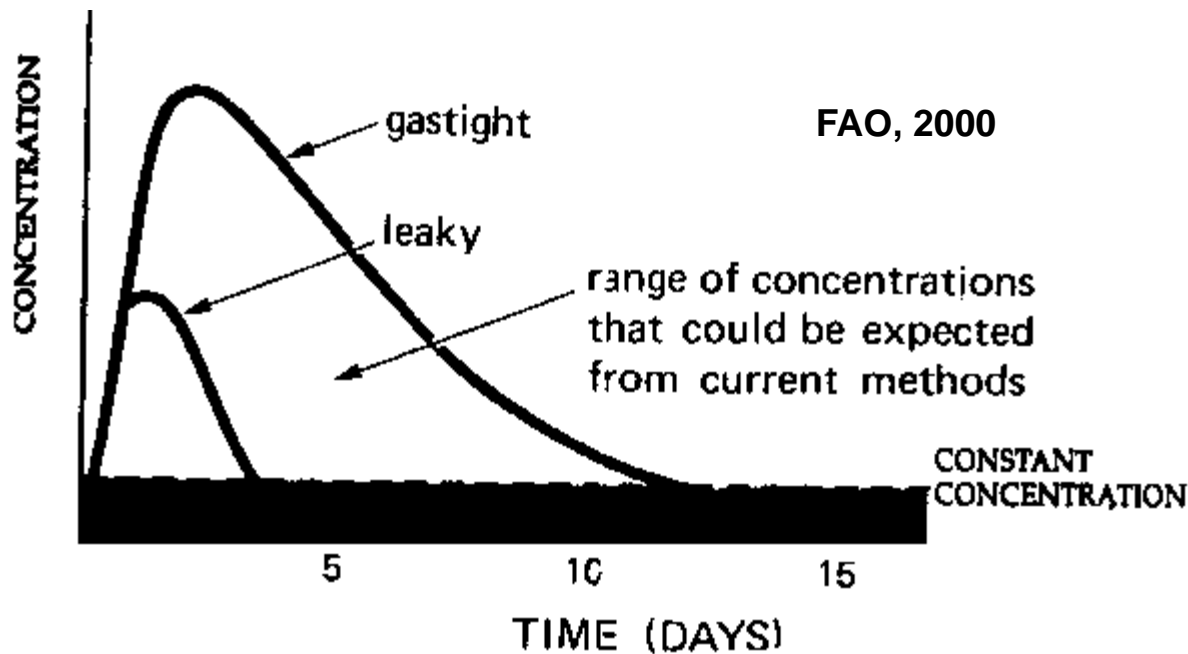
Risks:

- Greater exposure...



Efficacy: Pesticide Resistance

Unknown Gas Concentration: Leaky (holes) or Gas Permeable Tarps (Need Impervious)



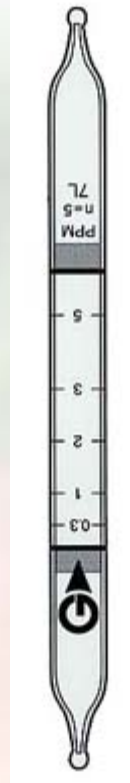
Think Gore Tex©: Liquid Impervious, but Gas Permeable = No Good

Post Application Gas Monitoring Devices



Direct Read-out Meter

- Accurate from 0-200 ppm
- Alarm that goes off at 0.3 ppm



Color-Metric Tube Detectors

- Color change over a range from 0.15-5 ppm



Draeger Tube Detectors

- Range from 0.01-10,000 ppm

Safety & Efficacy Needed

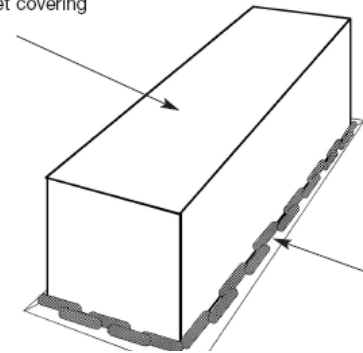
New Technology Practices:

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What is impact of Fumigation Assessment?

Early Feedback on New Practice of Technology:

No Gas Monitoring Equipment in Fumigation Service Providers (FSPs) in Liberia (as of July 2013)





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Impacts of Fumigation Assessment?

- Protect food aid resources and doing no harm
- Ability for USAID to speak authoritatively with scientific-evidence basis to justify
- New technologies into program warehouse operators and fumigation service providers
- Agency resource for food security programs, BFS
- Improve country warehousing, global market standards





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USAID Programmatic Environmental Assessment for Commodity Fumigation

Under External Public Review with the Food Aid Consultative Group (FACG)

Stakeholder review through August 30, 2013

Public review drafts and comment instructions at:

- <http://www.usaidgems.org/fumigationpea.htm>

