National Association of Clean Air Agencies Fumigation Workshop

Fumigation 101

May 21, 2024

AGENDA

- What is the Fumigation Process?
- What Fumigants are used?
- Where does It happen?
- Does your State have these facilities? How do you identify them?
- Remedies to Reduce Risk
- Comparison/Contrast to Ethylene Oxide (EtO) Sterilization

What is Fumigation?

- Fumigation is a process that attempts to kill pests by completely filling an enclosed area with gaseous chemicals (pesticides/fumigants)to suffocate or poison the pests within.

- Common Fumigation Operations include:
  - Buildings (structural) fumigation?
  - Fumigation of agricultural commodities including farmers' fields (strawberries) and crop storage (grain silos)
  - Quarantine and Pre-treatment of goods to be stored, imported or exported to prevent transfer of exotic organisms (containers, stacks, silos, etc)
    - **table grapes, lumber, cocoa beans, spices**

Why does fumigation need to happen?

- USDA and FDA have requirements for many good reasons
  - Invasive Species
  - Food Safety
  - Sanitary Working Conditions

- Their goal, in general, is to kill the pests

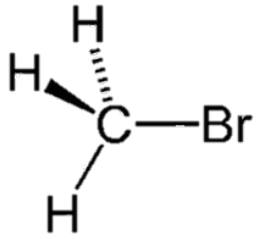
- EPA/State Environmental Agencies in place to protect human health and the environment

- Different and partially overlapping mandates – both mandates need to be addressed

What gets fumigated?

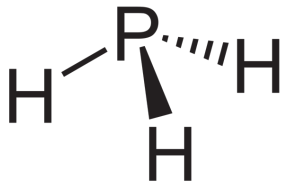
Short Answer: Nearly anything

What are commonly used fumigants?



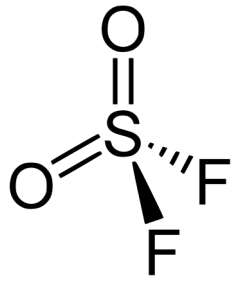
Methyl bromide

- HAP
- VOC
- Colorless and Odorless
- Ozone Depleting Substance
- High Toxicity
- Limiting Ban - 2005



Phosphine

- HAP
- NOT a VOC
- Colorless and Garlic/Fish like Odor
- High Toxicity

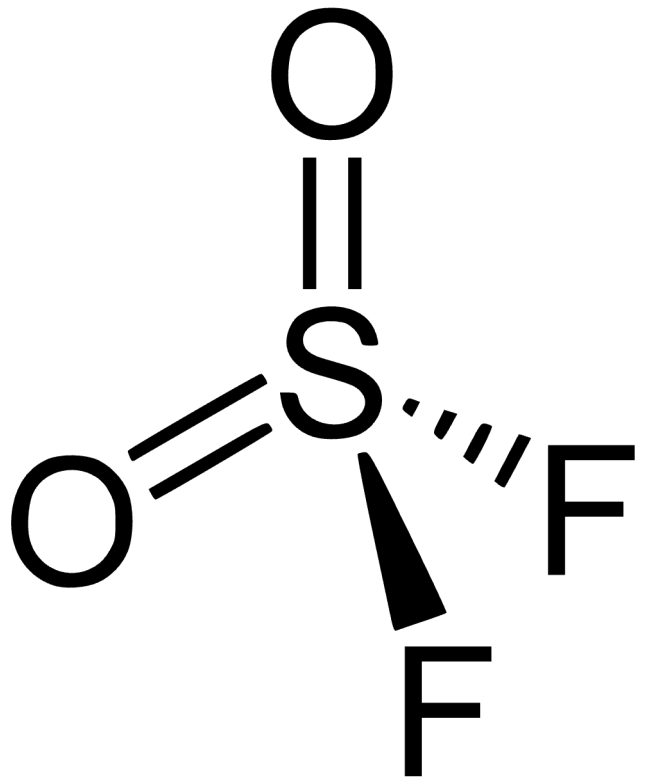


Sulfuryl fluoride

- NOT a Federal HAP
- NOT a VOC
- Colorless and Odorless
- Greenhouse Gas
- High Toxicity
- EPA proposed to withdraw food residue tolerances in 2012 (not adopted)

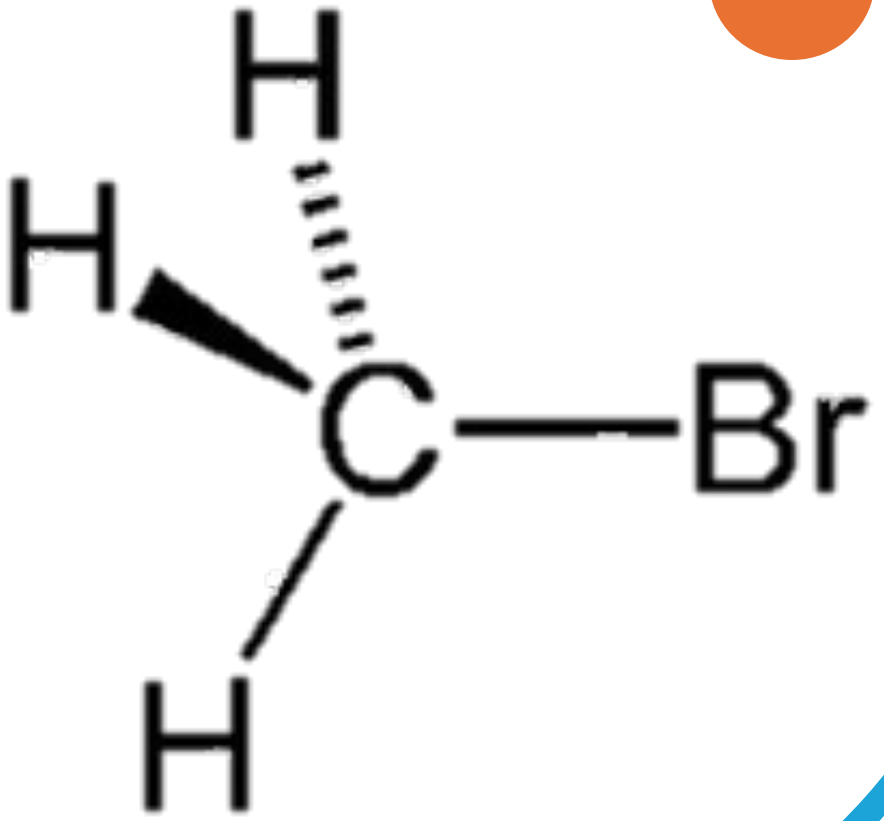
Sulfuryl Fluoride (SF)

- Commercial names: Vikane® (+ chloropicrin, odor agent) and ProFume®
- Regulated by USDA (Agriculture) and US FDA
- Uses:
  - Insecticide and rodenticide fumigant
    - Residential structures
    - **Processed-food and pet food facilities**
    - **Warehouses**
    - **Shipping containers**
  - **Synthesis of organic drugs and dyes**
- Registered in the US as a pesticide since 1959
- Sold/used as a liquefied gas in pressurized steel cylinders

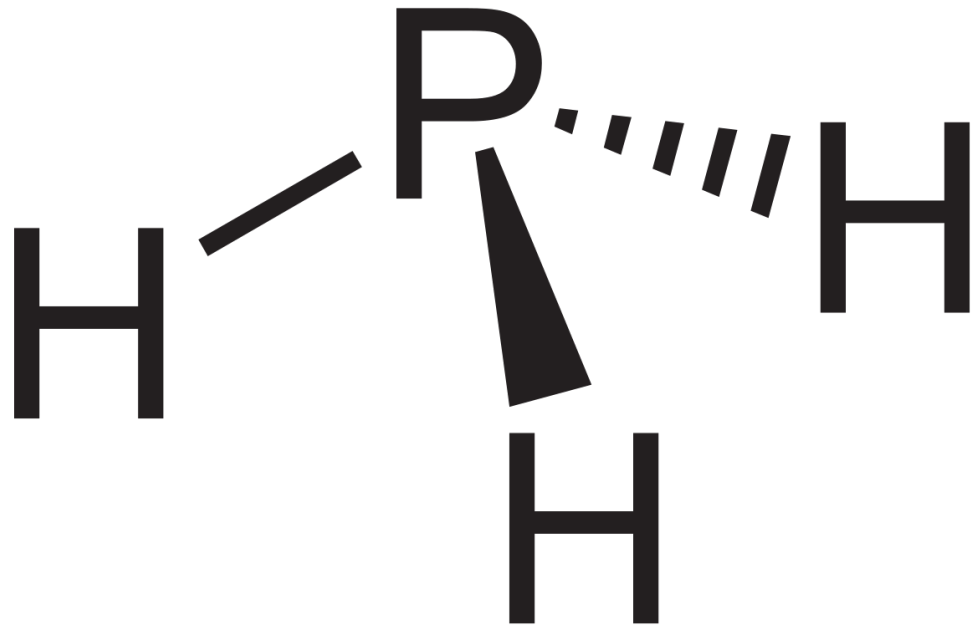


Methyl Bromide

- Stratospheric Ozone depleting substance
- Regulated by the Montreal Protocol in 1986
- U.S. production and import is banned since 2005, except for:
  - "quarantine and pre-shipment" purposes → **commodity fumigation**
  - "critical use exemption" of agriculture applications
- Currently regulated as a HAP by USEPA and NJDEP
  - Toxicology data by IRIS and CalEPA



Phosphine



- Commercial name: ECO2FUME™
- Regulated by USDA (Agriculture) and US FDA
- Used as an insecticide for the fumigation of grains, animal feed, and leaf-stored tobacco, and as a rodenticide
- Restricted Use Pesticide (RUP) because of its acute inhalation toxicity
- Currently regulated as a HAP by USEPA and NJDEP
  - Toxicology data by IRIS and CalEPA
- Registered in the US as a pesticide since 1999

Where is fumigation done? What does it look like?

- Truck Container - Yes
- Cargo Container - Yes
- Stacks or piles of Material – Yes
  (Inside or Outside Building)
- Silos - Yes
- Chamber or Vault (like EtO) – Not in NJ so far

Truck Container Of Logs

Shipping Container

Tarpaulin Chamber

Inside a Building

Silo

Animal and Plant Health Inspection Service (APHIS) Technical Manual

From APHIS Tech Manual Treatment Manual (usda.gov)

Well-Ventilated, Sheltered Area

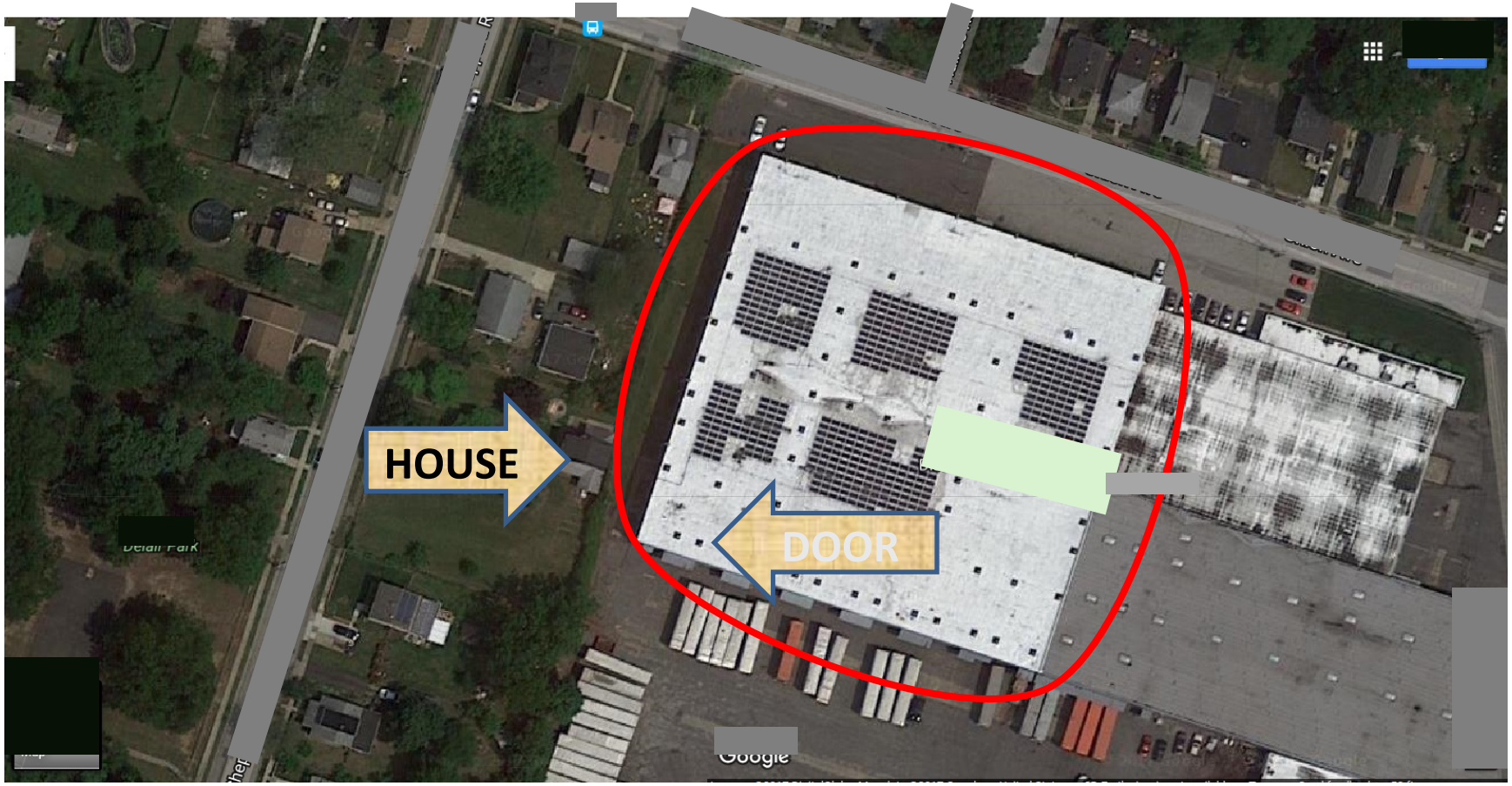
p.2-4-8 and 2-9-11 "When treatments are conducted in a particular location on a regular basis, the PPQ official must ensure that the fumigator designates a permanent site. At such sites, the fan used to remove the fumigant from the enclosure during aeration must be connected to a permanent stack extending above the roof level."

Aerating Sorptive, Noncontainerized Cargo—Indoors and Outdoors

p. 2-4-45 "Extend the exhaust duct outlet to an outside area where there is adequate ventilation and at least 30 feet away from the building or through a vertical exhaust stack extending through the roof."

Where is the Buffer?

Problem?



Learn from EtO experience!

If you look, you will find!

How do you find these facilities?

- Enforcement Advisory
- Identify Fumigation operators
- Information Inquiry
- Permit Request Follow Up
- Clarity in Rule Making

Fumigation Advisory

- Put out a clear message of expectations
- What rule are you citing?
  - Permitting Threshold
  - Air Toxic (Fumigant) Reporting Threshold
- Do you have a Toxics program to reference?

Identify Fumigation Operators

- Identify Fumigation Operators
  - Well known list of fumigation companies
  - Yellow Pages, Google, other States
- USDA List of Fumigation Sites
- State Pesticides Program
- Incident Reporting/Whistleblowers?

Information Inquiry

- Send information request letter to the fumigators
  - How much was used for fumigation per location?
    - Per event
    - Per year
- Be clear in your letter what Permitting threshold and reporting threshold are

Permit Application Request Follow Up

- Call in permits based on enforcement actions?
  - OR enforcement action if no response to permit application request?
- Meet with each operator
  - On-site preferable
    - ***Personnel (unless fully trained) should not be on site during actual fumigation***
  - Off-site okay
- Withdrawals are followed up and confirmed by enforcement
- Enforcement if non-responsive?

Clarity in Rule Making?

- Are the permitting thresholds appropriate for the fumigants?
- Are the reporting levels appropriate for the fumigants?
- Stakeholder Input Critical
- Emergency Provisions?

Remedies to Reduce Risk

- Treatment
- Dispersion – Stack Height/Stack Flow
- Minimum Aeration Times to Avoid Residual Fumigants in Commodity
- Substitutes – keep in mind the substitute must still “kill” the pest
  - Ethyl Formate maybe an option to replace Methyl Bromide for Chilean Grapes?

Stack Tests and Monitoring

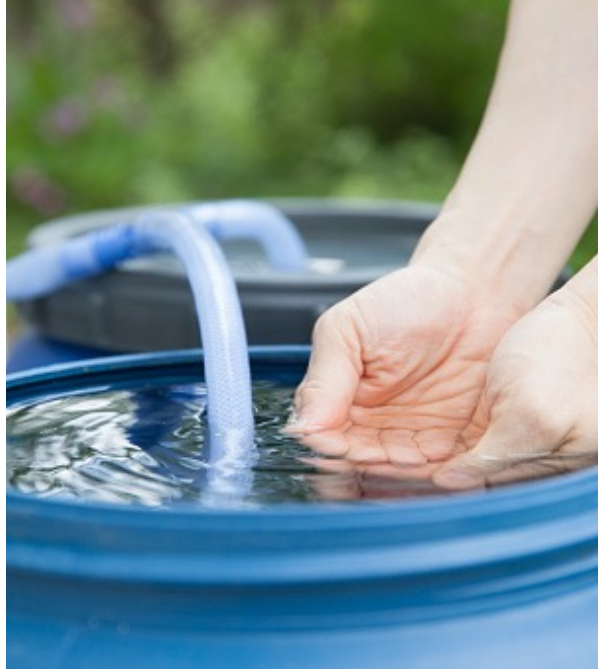
- Stack Test not terribly practicable (or necessary)
  - What Goes in Must Come out (Residual minimal)
  - Majority of Release is over short period time and not a uniform flow

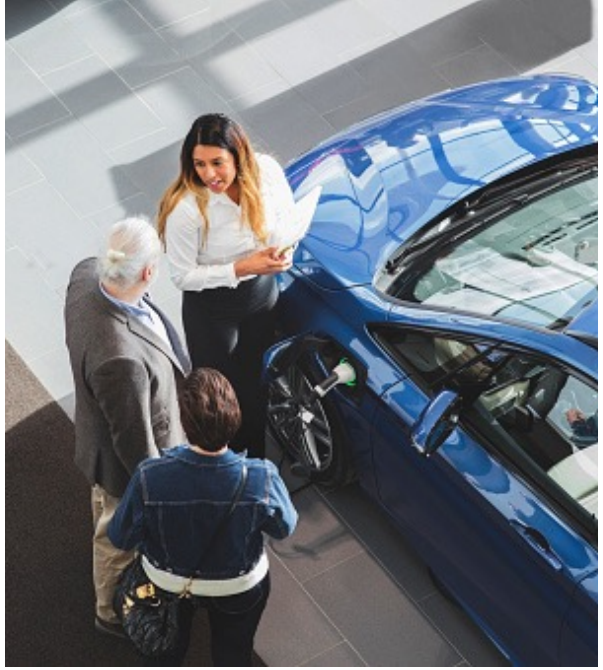
- Monitoring
  - Stack Monitoring – What Goes in Must Come out
  - Fenceline Monitoring – YES, in select cases
    - Expensive, but appropriate if very high risk concerns

70 Foot Portable Stack

Fumigation vs. EtO Sterilization

	Designed to kill pests	Area of Work	Air Toxics	Steps	Treatment?	Risk	Fugitive Emissions	Risk Type	MACT
Fumigation	Bugs/Rodents	Chamber, Tarpaulin, or any Container		1) Setup 2) Fumigation 3) Aeration	Rarely		• Not a tight seal • Residual in Commodity	Short Term & Long Term	Not on the Radar Case by case
EtO Sterilization	Microbes	Chamber		1) Setup 2) Sterilization 3) Aeration	Always		• Residual in Commodity	Carcinogenic (long term)	





Thank you!

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