Pesticide Safety & Pesticide Use Gone Awry

Urban Pest Management Course
February 1, 2017
What is a Pesticide?

The Pesticide Umbrella

- Miticides
- Rodenticides
- Disinfectants
- Insecticides
- Herbicides
- Fumigants
- Fungicides

The Pesticide Umbrella
The Label and Personal Protective Equipment (PPE)
At a minimum....

- Long-sleeved shirt
- Long trousers or coveralls
- Gloves
- Shoes plus socks
- No Sandals!

Protect Yourself!
Routes of Entry: Eyes

Eyes are able to absorb surprisingly large amounts of chemical...
Wash your hands!

Routes of Entry: Oral/Ingestion
**Routes of Entry: Lungs (inhalation)**

Inhalation exposure can occur:

- When using
  - Wettable powders
  - Dusts
  - Gases, vapors
  - Sprays
- While mixing and loading
- During applications
Routes of Entry: Skin (Dermal)

97% of all body exposure during spraying is by skin contact!
Skin Absorption

Different parts of the body and absorption potential...

- Scalp 32%
- Ear Canal 40%
- Abdomen 18%
- Genital Area 100%
- Ball of Foot 13%
- Forehead 36%
- Armpit 64%
- Forearm 9%
- Palm 12%
- Back of Hand 21%

Percent Dose Absorbed
Chemical-parathion
Maibach 1974
Contact Effects

• **Skin irritation** (dermatitis): itching, redness, rashes, blisters, burns
• **Eyes**: swelling, stinging, burning
• **Nose, mouth, throat** irritation
• Typical of herbicides, fungicides and other products

Contact injury to the skin is the **most common** form of pesticide poisoning!
Systemic Effects

• From pesticides that target animals
  – Insecticides: nervous system
  – Rodenticides: circulatory system

• Insecticide symptoms: nausea, vomiting, diarrhea, headache, dizziness, weakness, excessive sweating, tearing, chills, thirst, chest pain, breathing difficulty, body aches & cramps
Allergic Effects

- Contact or Systemic
- Dermatitis, blisters, hives
- Life-threatening shock
- Red or itchy eyes
- Respiratory discomfort, asthma
Other effects..

Low dose exposures over an extended period of time

- Production of tumors
- Genetic changes
- Birth defects
- Reproductive effects
- Toxicity to a fetus
- Nerve disorders
- Blood disorders
Background Information

Written HazCom Program

Label  SDS  Training
Hazard Communication Written Program

What should it include?

- Who is in charge of updating information
- List of hazardous chemicals (including pesticides) used by employees
- Safety data sheets - location where they are kept
- Labeling requirements
- Description of non-routine hazardous tasks
- Hazard communication to contractors
Hazard Communication Training

What should training include:

1. What types of hazard chemicals are present in the workplace
2. Inform the employee of the written hazard communication program
3. The physical and health hazards of chemicals
4. Methods used to determine a leak or release of hazardous chemicals in the workplace
5. How to reduce the exposure to these chemicals, the use of best work practices and personal protective equipment.
6. Emergency Procedures is an employee is exposed to hazardous chemicals
7. How to read labels and review SDS
Pesticide Signal Words

- **Danger Poison** – can cause death in very low doses.
- **Danger** – Corrosive irreversible eye damage
- **Warning** – Moderately toxic
- **Caution** – Slightly toxic through oral, dermal, or through inhalation, or causes slight eye and skin irritation.
Which PPE?

• Activity
  - Measuring, mixing, loading
  - Applying
  - Maintenance
Read the label!!

• Follow directions

  PPE for pesticides

    - Task

    - How applied

*Minimum requirements are given – can wear more
**NON-WPS TURF USES:** Applicators and other handlers who handle this pesticide for any use NOT covered by the Worker Protection Standard (40 CFR Part 170) - in general only agricultural plant uses are covered by the WPS - must wear face shield, goggles, or safety glasses and long pants, long-sleeved shirt, socks, shoes and rubber gloves when mixing, loading or applying this product. It is recommended that safety glasses include front, brow, and temple protection. In addition to the clothing and eye protection listed above, commercial mixer/loaders must wear chemical resistant in place of rubber gloves except when the product is to be applied to a golf course. After using this product, rinse gloves before removing, remove clothing and launder separately before reuse, and promptly and thoroughly wash hands and exposed skin with soap and water.

**WPS USES:** Applicators and other handlers who handle this pesticide for any use covered by the Worker Protection Standard (40 CFR Part 170) - in general, agricultural plant uses are covered - must wear coveralls over short-sleeved shirt and short pants, waterproof gloves, chemical-resistant footwear plus socks, protective eyewear, chemical resistant headgear for overhead exposure and chemical-resistant apron when cleaning equipment, mixing or loading. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining Personal Protective Equipment (PPE). If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry. After each day of use, clothing of PPE must not be reused until it has been cleaned. If this container is over one gallon and less than five gallons, mixers and loaders who do not use a mechanical system (such as a probe and pump or spigot) to transfer contents of this container must wear coveralls or a chemical resistant apron in addition to the other required PPE.
Chemical-Resistant Clothing

- Prevents most chemicals from reaching the skin
- PVC plastic, rubber, non-woven coated fabrics
Chemical-resistant Materials

❖ Read the label

What PPE is specifically required???

DANGER
Corrosive • Causes Irreversible Eye Damage • Harmful If Swallowed Or Absorbed Through Skin • Prolonged Or Frequently Repeated Skin Contact May Cause Allergic Reaction In Some Individuals
Do not get in eyes or on skin or clothing.

Personal Protective Equipment (PPE)
Applicators and other handlers must wear:
• Long-sleeved shirt and long pants
• Shoes plus socks
• Protective eyewear
• Chemical resistant gloves (≥14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber
## Chemical Resistant Gloves

### Environmental Protection Agency chemical resistance categories for selected personal protective materials

<table>
<thead>
<tr>
<th>Selection category listed on pesticide label</th>
<th>Butyl rubber ≥14 mils</th>
<th>Nitrile rubber ≥14 mils</th>
<th>Neoprene rubber* ≥14 mils</th>
<th>Natural rubber ≥14 mils</th>
<th>Polyethylene</th>
<th>Polyvinyl chloride (PVC) ≥14 mils</th>
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* Includes natural rubber blends and laminates.

**Key:**
- **High:** Highly chemical resistant. Clean or replace PPE at end of each day’s work period. Rinse off pesticides at rest breaks.
- **Moderate:** Moderately chemical resistant. Clean or replace PPE within an hour of contact.
- **Slight:** Slightly chemical resistant. Clean or replace PPE within 10 minutes of contact.
- **None:** Not chemical resistant. Do not wear this type of material as PPE when contact is possible.
Use Gloves!

- Especially during mixing & loading
- Unlined and waterproof
- Check for holes
- If spraying overhead, tuck sleeves inside gloves...

... and fold the cuffs up
• NO ABSORBENT MATERIALS! (unless the label says)
Coveralls
In general

- Wear loosely over clothing
- Zippers should be covered
- Two-piece: top should extend well below the waist and remain untucked
Chemical-Resistant Aprons

Use when:

- label requires
- mixing and loading
- cleaning equipment
PPE Wear and Tear

- Watch for signs of wearing and degrading:
  - color change
  - spongy
  - swollen
  - jelly-like
  - cracked
  - brittle
Chemical Resistant Footwear

❖ One piece, pull-on boots of natural rubber, could be coated with polyurethane, PVC, or blends.

❖ Disposable or reusable shoe covers.

DON’T BRING YOUR WORK HOME—LEAVE YOUR FOOTWARE AT WORK!
Resistant to chemicals
NOT CHEMICAL RESISTANT...
When should a respirator be used?

- When the product label requires it
- When exposed to spray mist
- When working in confined spaces
- When using dusts, gases, vapors, or fumigants
Respirators

Prevent pesticide exposure through the respiratory system
Air-purifying

TC-84A P-100

TC-23C

PAPR TC-23C HE filter

PAPR TC-21C HE filter
Respirator use requires...

- Written Program
- Medical Evaluation-BEFORE use
- Fit Testing-AFTER eval and BEFORE use
- Training-BEFORE use
- Proper Maintenance
Respirator Cleaning and Storage

Does this look o.k.? Vs. This?
Also bring a decon kit...

- Additional water if needed
- Soap (not hand sanitizer)
- Single use towels
- Extra clothing (or a Tyvek suit)
- Large bottle of eyewash solution (Pint size or more)
- 15-minute eye wash unit if mixing Danger pesticides at the work site
Clean Up!

- Discard disposables and worn-out items!
- Wash at the end of each day, including gloves and all PPE—hot water and detergent
- Launder pesticide clothing
Do not take PPE home to clean. Clean it at the work site...
Keep all PPE—new and used—separate from pesticides in storage!!
Separate from family clothing

And wash contaminated clothing in hot water with detergent
Pesticide Exposure Case Studies

- Restoration work
- Transportation
- Forestry
- Health care setting
Pesticide Exposure Case #1: Restoration Work-Mold Abatement

Investigator: Brandi Davis, Oregon OSHA
September 2015
Origin: Complaint
What Happened?

- 3 employees-mold remediation in a crawl space
- MDF 500 (disinfectant) used
- Using hand sprayer bottles and hand pump containers
- Wiping and spraying a second time.
Symptoms

• 1 employee reported rash to employer on the morning of second day of work. The rash turned from red to black overnight.
• Supervisor went to job site after report. Other two employees had rashes-face, arms, shoulders.
• Supervisor told employees to “wash”. Didn’t tell how or stay to supervise. Employees rinsed with 1 liter of water.
• After 2nd day of work another employee began experiencing intense burning after shower. Went to hospital as well.
**Danger**

**KEEP OUT OF REACH OF CHILDREN**

**First Aid**

**IF IN EYES:** Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Call a poison control center or doctor for further treatment advice.

**IF ON SKIN:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for further treatment advice.

**IF SWALLOWED:** Call a poison control center or doctor immediately for treatment advice. Have a person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

**IF INHALED:** Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth to mouth, if possible. Call a poison control center or doctor for further treatment advice.

**NOTE TO PHYSICIAN:** Probable mucosal damage may contraindicate the use of gastric lavage.

**PRECAUTIONARY STATEMENTS**

**HAZARDS TO HUMANS AND DOMESTIC ANIMALS**

**Danger:** Corrosive. Causes irreversible eye damage. Causes skin irritation. Harmful if inhaled. Do not get in eyes, on skin, or on clothing. Avoid breathing vapor or spray mist. Wear protective eyewear such as goggles, face shield or safety glasses. Wear chemical resistant gloves. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.
MDF-500 PART A

DIRECTIONS FOR USE – It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. This product is designed specifically as a general cleaner and disinfectant for use in homes, hospitals, and other facilities. It is formulated to disinfect hard, non-porous, inanimate environmental surfaces such as hard countertops, stainless steel, porcelain, glazed ceramic tile, plastic surfaces, bathrooms, shower stalls, tile walls of swimming pools. May be used in the kitchen on non-food contact surfaces. If used on food contact surfaces, wash with potable water prior to food contact. In addition, this product deodorizes areas that are hard to keep clean, including garbage cans, basements, restrooms and areas prone to odors.

PRE-CLEANING – Prior to use on surfaces, remove gross filth, spray the mixture (Part A and Part B) on the surface and allow to penetrate (about 2 minutes), and then clean thoroughly.

MODEC DECON FORMULA USE INSTRUCTIONS – MDF-500 is a binary (two-part) system. Part A is a deionized water-based formulation; Part B is a hydrogen peroxide based formulation. Allow the product to remain on the surfaces for 10 minutes. Apply the solution as a spray onto surfaces as directed below. The mixed solution has an efficacious pot life of 8 hours.

DISINFECTION – Follow Pre-Cleaning instructions listed above. To disinfect surfaces, apply to a surface and allow to remain wet for 10 minutes. No scrubbing is necessary. The product will not harm the surface. Various microorganisms can be killed by the deionized water formulation, and a variety of bacteria, viruses, fungi, and protozoa are inactivated by the hydrogen peroxide formulation. The mixed solution is effective against Staphylococcus aureus, Salmonella enterica, and Pseudomonas aeruginosa. The mixed solution is also effective against influenza virus (including H1N1) and Norovirus (Feline Calicivirus). The mixed solution is effective against preferential targets, such as mold and mildew on porous surfaces. To control mold and mildew on non-porous surfaces, the mixed solution should be used in conjunction with a mold and mildew control product.
Citations & contributing factors

- No haz com
- No SDS info
- No secondary container labeling
- Lack supervision
- Broken equip
Some citations/contributing factors

- Improper PPE
- No eye protection
- Incorrect respirators
- Tyvek suits don’t protect from liquids-skin contact with chems for long time
- No eye wash and decontamination supplies
PESTICIDE EXPOSURE:
CASE #2 TRANSPORTATION
ORIGIN: OERS REPORT

Investigator:
Garnet R Cooke Pesticide Coordinator, Oregon OSHA 2008
Some where on a road in the Willamette Valley....

Photo: Officer T. VanCleve
Agencies that Responded

Carlton Fire District

DEQ
State of Oregon Department of Environmental Quality

Oregon OSHA

OSFM
Oregon State Fire Marshal

Premier Public Safety Services
Pesticide Product: Trust
Active Ingredient: Trifluralin
Pesticide Type: Herbicide
Signal Word: CAUTION
What went wrong?

- Containers were **not** secured
- **Confusion** at cleanup – responders received conflicting reports on what to do.
- The first cleanup was **not** done in accordance with the SDS
- Strong odors were still present, resident contacted DEQ
- DEQ reviews the SDS and works with grower: **second** cleanup follows SDS.
Contributing Factors: The Whys

Photo: Officer T. VanCleve
PESTICIDE EXPOSURE:
CASE # 3 – FORESTRY
ORIGIN: PARC REFERRAL

Investigator:
Garnet Cooke, Pesticide Coordinator, Oregon OSHA
2010
The Setting

- Two employees offered to help their employer spray Christmas trees.

- Application equipment:
  - Powered back-pack sprayer
Pesticide Product: Warhawk
Active Ingredient: Chlorpyrifos
Pesticide Type: Insecticide
Signal Word: WARNING
Restricted Use Product: Yes
RESTRICTED USE PESTICIDE
For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator’s certification.

WARHAWK®

For control of listed insects infesting certain field, fruit, nut, and vegetable crops.

ACTIVE INGREDIENT:
chlorpyrifos, O-clethyl-O-(3,5,6-trichloro-2-pyridyl) phosphorothioate ........................................... 44.9% OTHER INGREDIENTS*: ........................................... 55.1% TOTAL ........................................... 100.0%

Contains 4 pounds of chlorpyrifos per gallon.
*Contains aromatic petroleum distillates.

KEEP OUT OF REACH OF CHILDREN
WARNING—AVISO
Si usted no entienda la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

EPA REG. NO. 34704-857
EPA EST. NO. 34704-MS-001

sonal protective equipment required above for mixers/loaders, wear protective eyewear if the system operates under pressure, and be provided and have immediately available for use in an emergency, such as broken package, spill, or equipment breakdown. coveralls, chemical resistant footwear and chemical-resistant headgear if overhead exposure.
Pilots must use an enclosed cockpit in a manner that meets the requirements listed in the WPS for agricultural pesticides [40 CFR 170.240(d)(4)].

Use of human flaggers is prohibited. Mechanical flagging equipment must be used.

When handlers use closed cab motorized ground application equipment in a manner that meets the requirements listed in the WPS for a agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

USER SAFETY RECOMMENDATIONS
Users should:
• Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
• Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
• Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

With Pesticides: THE LABEL IS THE LAW
What the Label Said

• All mixers, loaders, applicators and handlers **MUST wear:**
  • Coveralls over long-sleeved shirt, long pants
  • Chemical resistant gloves
  • Chemical resistant apron when mixing or loading or exposed to the concentrate.
  • Chemical resistant footwear plus socks
  • Chemical resistant headgear for overhead exposure
  • A NIOSH approved dust-mist respirator
Reality Check: What was worn

• An ½ face respirator with rusty organic vapor cartridges
• T-shirt with cut off sleeves
• Carhartt jeans
• Leather boots & socks
Preparation for Spraying

• Were the employees trained on the pesticide label? **NO**
• Did the employees receive training on Hazard Communication including the SDS? **NO**
• Did the employees receive Pesticide Safety Training in accordance with the Worker Protection Standard? **NO**
• Were the employees provided with training on Work Practices to minimize exposure? **NO**
The Application

- Each employee would walk up a row of trees spraying each side which involved walking through the mist and back down the other side.
- The tank would be refilled and the other employee would repeat the task.
- This continued for 3 hours.
- They were told to go home and shower.
Post spray activities

- Did the employees decontaminate? (Wash with soap and water, dry with towels)  No
- Why not?  No supplies
- Did they change clothes before getting into their personal rigs?  No
The End Result

• Employees experienced chemical eye burns, extreme shortness of breath, chest tightness, dizziness, numbness in face and hands, burning eyes and skin, and stomach cramps.
• Both were treated in the emergency room.
• Clothing and boots were disposed of, vehicles had to be decontaminated.
PESTICIDE EXPOSURE: CASE #4
VIRGINIA GARCIA CLINIC
ORIGIN: REPORTED BY INSURER

Investigators:
Lori L. Cohen, MS, Sr. Industrial Hygienist, Oregon OSHA
2013
Virginia Garcia Memorial Clinic

- Issue: Flea infestation
- Hired commercial pesticide applicator
- Application occurred immediately prior to the staff arriving to work.
- Staff physician indicated ~75% of staff affected
Pesticide Product: Precor 2000 Plus Premise Spray
Active Ingredient: Methoprene & Permethrin
Pesticide Type: Pyrethroid
Signal Word: CAUTION
Symptoms

- Vomiting
- Nausea
- Headaches
- Eye tearing
- Itching
- Difficulty breathing
Contributing Factors

• Lack of notification
• Failure to provide a SDS
• Did not close the clinic after ventilation did not improve the situation
• Failure to respond to employee concerns
General Exposure Factors

- Belief in the premise if you can purchase it, it must be safe
- Lack of awareness as to the hazards
- Failure to train
- Failure to provide/use PPE
- Failure to have a plan
Pesticide Analytical Response Center (PARC) Board Membership*

Agriculture  
Poison Center  
OR-OSHA

Forestry  
Fish & Wildlife  
Env. Quality  
Fire Marshal  
Health Services

* With consultation from OHSU’s CROET and OSU’s EMT Dept.
Contact Information:

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Industrial Hygienist
Oregon OSHA
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(503)229-5910