



CHAPTER 6

Personal Protective Equipment (PPE)



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National Pesticide Applicator Certification Core Manual



CHAPTER 6

Personal Protective Equipment (PPE)

This module will help you:

- ❖ Know the minimum PPE required to comply with the label.
- ❖ Understand PPE selection.
- ❖ Understand PPE care, storage, and disposal.





CHAPTER 6

Personal Protective Equipment (PPE)

- ❖ “Wearing PPE can greatly reduce the potential for dermal, inhalation, eye, and oral exposure, and thereby significantly reduce the chances of a pesticide poisoning.”



Required PPE is determined by...

- ❖ The **toxicity** of the pesticide
- ❖ The **formulation** of the pesticide
- ❖ The **activity you are performing**
 - ❖ Measuring, mixing and loading
 - ❖ Applying
 - ❖ Maintenance operations

Read the label!!

- ❖ Follow directions for PPE
 - ❖ Handlers
 - ❖ Applicators
 - ❖ Early entry workers
- ❖ *Minimum* requirements are given – **can wear more**



Chemical-resistant Materials

- ❖ Read the label
 - ❖ What clothing is specifically required



PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some materials that are Chemical-resistant to this product are listed below. If you want more options, follow the instructions for category F on an EPA chemical resistance category selection chart.

Applicators and other handlers must wear: A) Long-sleeved shirt; B) Long pants; C) Chemical-resistant gloves such as Barrier Laminate, Butyl Rubber, Nitrile Rubber or Viton; D) Shoes plus socks.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Chemical-Resistant Clothing

- ❖ Prevents most chemicals from reaching the skin
- ❖ Usual best choices—PVC plastic, rubber, non-woven plastic, rubber, non-woven coated fabrics



Rubber



Nitrile



PVC



Barrier
Laminate

Chemical-Resistant Clothing



- ❖ **Chemical resistant**—no measurable movement of the pesticide through the material during use—but may only be water resistant not waterproof
- ❖ **Waterproof**—(liquid proof) material keeps water-soluble materials out but may not necessarily keep out oil solvent based products and therefore not fully chemical resistant



Type of Personal Protective Material

	Barrier Laminate	Butyl Rubber ≥ 14 mils	Nitrile Rubber ≥ 14 mils	Neoprene Rubber ≥ 14 mils	Natural Rubber* ≥ 14 mils	Polyethylene	Polyvinyl chloride (PVC) ≥ 14 mils	Viton ≥ 14 mils
Selection Category Listed on Pesticide Label								
A (dry and water-based formulations)	high	high	high	high	high	high	high	high
B	high	high	slight	slight	none	slight	slight	slight
C	high	high	high	high	moderate	moderate	high	high
D	high	high	moderate	moderate	none	none	none	slight
E	high	slight	high	high	slight	none	moderate	high
F	high	high	high	moderate	slight	none	slight	high
G	high	slight	slight	slight	none	none	none	high
H	high	slight	slight	slight	none	none	none	high

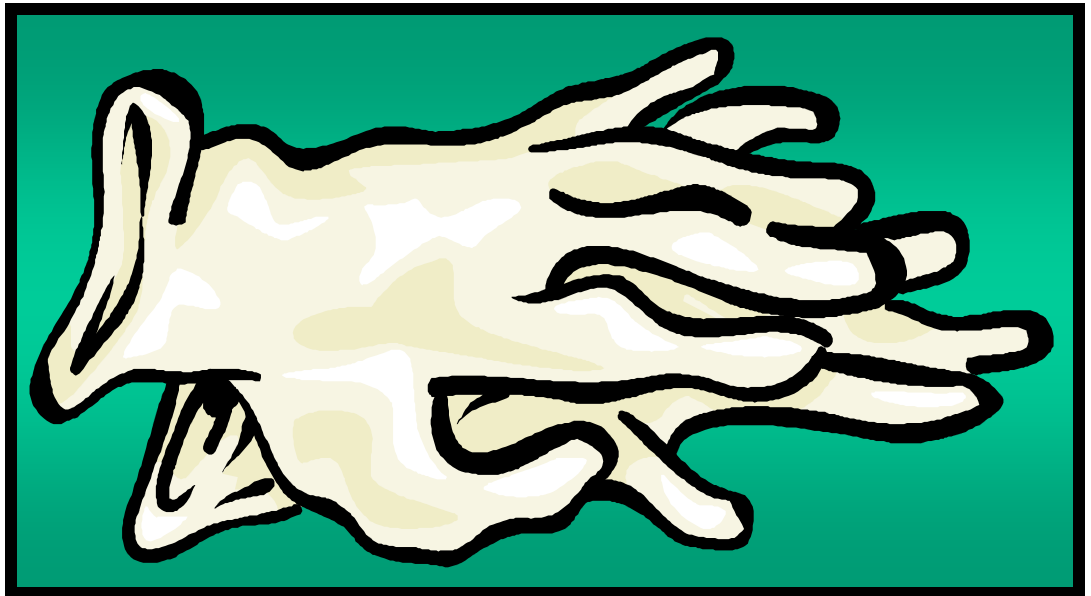
Chemical-Resistant Clothing



- ❖ **EPA Chemical Resistance Category Selection Chart**—compares use category with the type of resistant material. Code letters on clothing label notes which types of solvents it will resist.
- ❖ **Exposure time**—the exposure time chemical-resistant clothing remains resistant varies by which solvent the clothing is exposed to. **Check the manufacturers brochure!**

Chemical-resistant Materials

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



Personal Protective Equipment (PPE)

- ❖ Minimum:
- ❖ Long-sleeved shirt
- ❖ Long trousers or coveralls
- ❖ Gloves
- ❖ Shoes plus socks
- ❖ Hat

Protect Yourself!





Cotton, Denim, Leather: Not recommended for most pesticide applications!



Coveralls

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



Chemical-resistant Suits

- ❖ Offers the most protection
- ❖ Wears out with chemical contact over time
- ❖ Made of rubber or plastic
- ❖ May be too warm
- ❖ Drink plenty of water!
- ❖ Take frequent breaks!



Chemical-Resistant Aprons

- ❖ Use when:
 - ❖ mixing and loading
 - ❖ cleaning equipment
- ❖ From neck to knees
- ❖ **WARNING:** aprons can get caught in machinery!



Use Gloves!

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



... and fold the cuffs up



What is wrong with these gloves?



Lining can absorb pesticide!

NEVER use cotton gloves when
applying pesticides...
unless the label requires them



Gloves reduce dermal exposure by 99% when mixing, loading, and applying



Exception: Methyl bromide and other fumigant gases can become trapped inside gloves and cause burns



No gloves??



Fluorescent dye shows how much pesticide can get on the hands while handling it



Avoid Contaminating Your Gloves!

- ❖ The inside of gloves can be contaminated when you remove them during application to adjust PPE or open a pesticide container etc. then replace the gloves over your contaminated hands.
- ❖ If you must remove your gloves, wash them before taking them off and wash your hands before putting your gloves back on



Wear gloves according to how you are going to apply pesticides:

- Sleeves over gloves for jobs where your hands are mostly lowered
- Gloves outside sleeves with cuffs folded up 1 or 2 inches while spraying above your head
- Cuffed tight and taped with heavy-duty tape outside sleeve for when you will be working with your arms both raised and lowered



Check the label

to determine if you need specific chemical-resistant gloves, and what kind

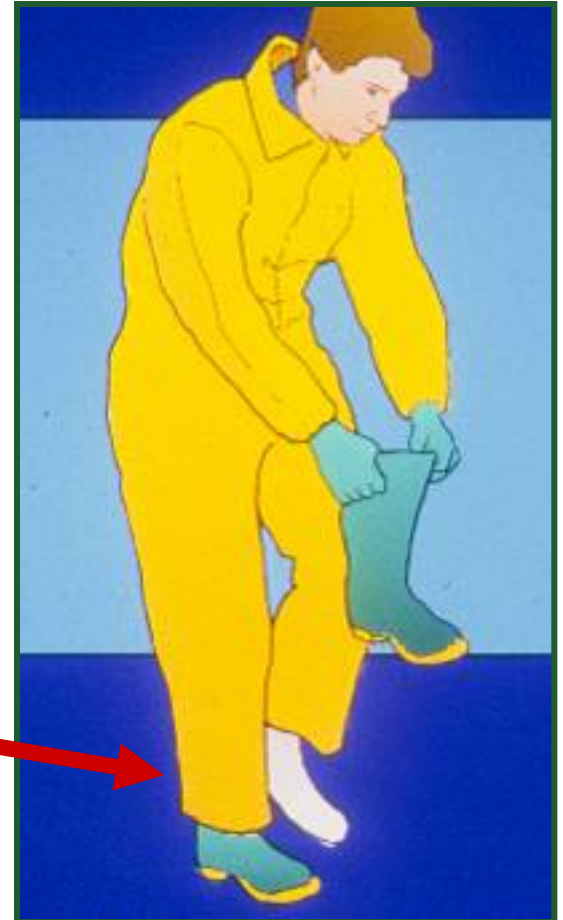
Personal Protective Equipment:

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category C on an EPA chemical resistance category selection chart.

Applicators and other handlers must wear: Long-sleeved shirt and long pants; Chemical-resistant gloves; such as Barrier Laminate or Butyl Rubber, or Nitrile Rubber or Neoprene Rubber or Polyvinyl Chloride or Viton; Shoes plus socks; Protective eyewear when mixing or loading, when performing maintenance or repairs (such as repairing/replacing hoses, cleaning, replacing or unplugging nozzles) on contaminated equipment or equipment containing residual carbofuran, or when cleaning the equipment or vehicle containing, or contaminated with carbofuran. For exposure in enclosed areas: A respirator with either an organic vapor-removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH approval number prefix TC-23C), or a canister approved for pesticides (MSHA/NIOSH approval number prefix TC-14G), or a NIOSH approved respirator with an organic vapor (OV) cartridge or canister with any R, P or HE prefilter; For exposures outdoors: Dust/mist filtering respirator (MSHA/NIOSH approval number prefix TC-21C), or a NIOSH approved respirator with any R,P or HE filter.

Footwear

- ❖ No sandals!
- ❖ Consider wearing unlined, rubber boots... even if not required
- ❖ Hang pant legs **outside** the boots!



Hats & Hoods

- ❖ Liquid-proof with a wide brim
- ❖ No absorbent materials!
- ❖ Chemical-resistant hoods on jackets



Protect your eyes when mixing concentrates or handling dusts or toxic sprays

Eyewear should have shields on all sides!



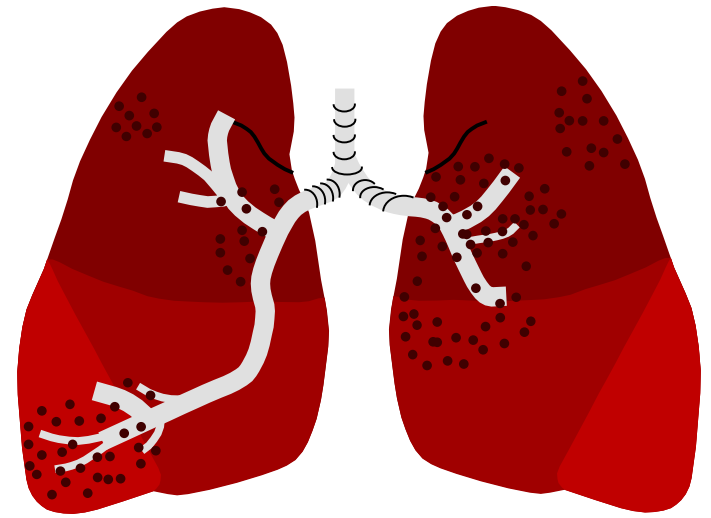


If goggles are required, so is access to an eyewash dispenser!



A portable eyewash is recommended for people in the field without access to a stationary eyewash

Respirators



There are two types of respirators:
air-purifying and air-supplying

Air-purifying respirators can be
powered or non-powered

Respirator Safety

- ❖ The National Institute for Occupational Safety and Health (NIOSH) sets the standards for respirators
- ❖ NIOSH classifies types of respirators with TC code designations



Always Select Equipment Approved by:

- ❖ National Institute of Occupational Safety and Health (NIOSH)
- ❖ Make sure the cartridge or filter is rated for the pesticide you are using
- ❖ Read the label



When should a respirator be used?

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



Air-purifying Respirators

- ❖ There are two types of respirators: air-purifying and air-supplying

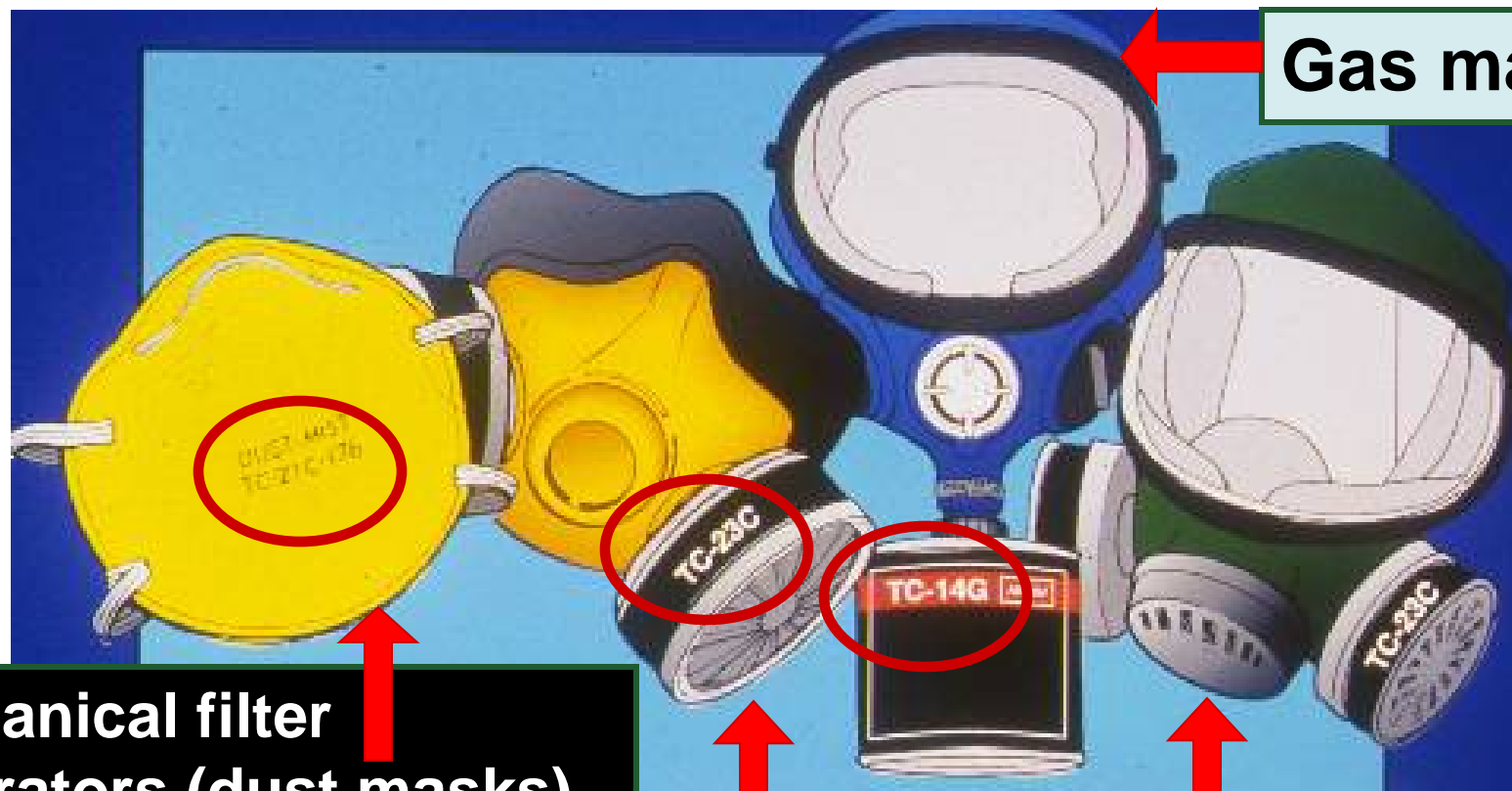


Air-purifying Respirators

- ❖ Air-purifying respirators can be powered or non-powered



Air-purifying Respirators



Gas masks

Mechanical filter respirators (dust masks)

Chemical cartridge respirators

Chemical Cartridge and Canister Respirators

- ❖ Both half-face mask and full-face mask styles
- ❖ Get cartridges that are right for the chemicals you are using!



Air-Supplying Respirators

- ❖ Provide clean, uncontaminated air from an outside source. Use when:
 - ❖ oxygen level is low
 - ❖ when applying fumigants in enclosed areas such as grain bins
- ❖ Self-contained breathing apparatus (SCBA) shown.



Which type of respirator is this?

Air-purifying or air-supplying?



Use and Care of Respirators

- ❖ Fit-check (also called user seal check) the respirator and make sure it works before every use
- ❖ **MUST have tight seal!**
- ❖ Make sure valves are in proper working order



Use and Care of Respirators

- ❖ Replace filters
 - ❖ Taste, smell, breathe
 - ❖ State regulations
 - ❖ Manufacturer recommendations



Fit test your respirators...

- ❖ Physician check up
- ❖ Prior to initial use
- ❖ Whenever a different facepiece is used
- ❖ *At least every year thereafter*
- ❖ States may have regulations



Qualitative Fit Test



Wand with irritant is placed inside area with respiratory user

Quantitative Fit Test



- ❖ A special instrument compares the dust particle concentration in the surrounding air with the concentration inside the respirator
- ❖ The ratio of these concentrations is called the **fit factor**
- ❖ Wearer performs same movements as in the qualitative test, and the device continues to measure the concentration of particles

Fit check before each use!

❖ Positive pressure check:

Put hand over exhalation valve and exhale gently. If there is pressure in the mask, it's a good fit



Fit check before each use!

- ❖ **Negative pressure check:**
Cover cartridges with hands, inhale gently, and hold breath for 10 seconds. If the facepiece exhibits no leakage, the respirator fits properly
- ❖ **Facial hair does not allow a respirator to seal!**



- ❖ After each use, remove filters and wash the facepiece



- ❖ Store in a tightly-sealed bag in a clean, dry location, **not the pesticide storage areas**



Get to Fresh Air Immediately if...

- ❖ You smell or taste contaminants
- ❖ Your eyes, nose or throat become irritated
- ❖ Your breathing becomes difficult
- ❖ The air you are breathing becomes uncomfortably warm
- ❖ You become nauseous or dizzy

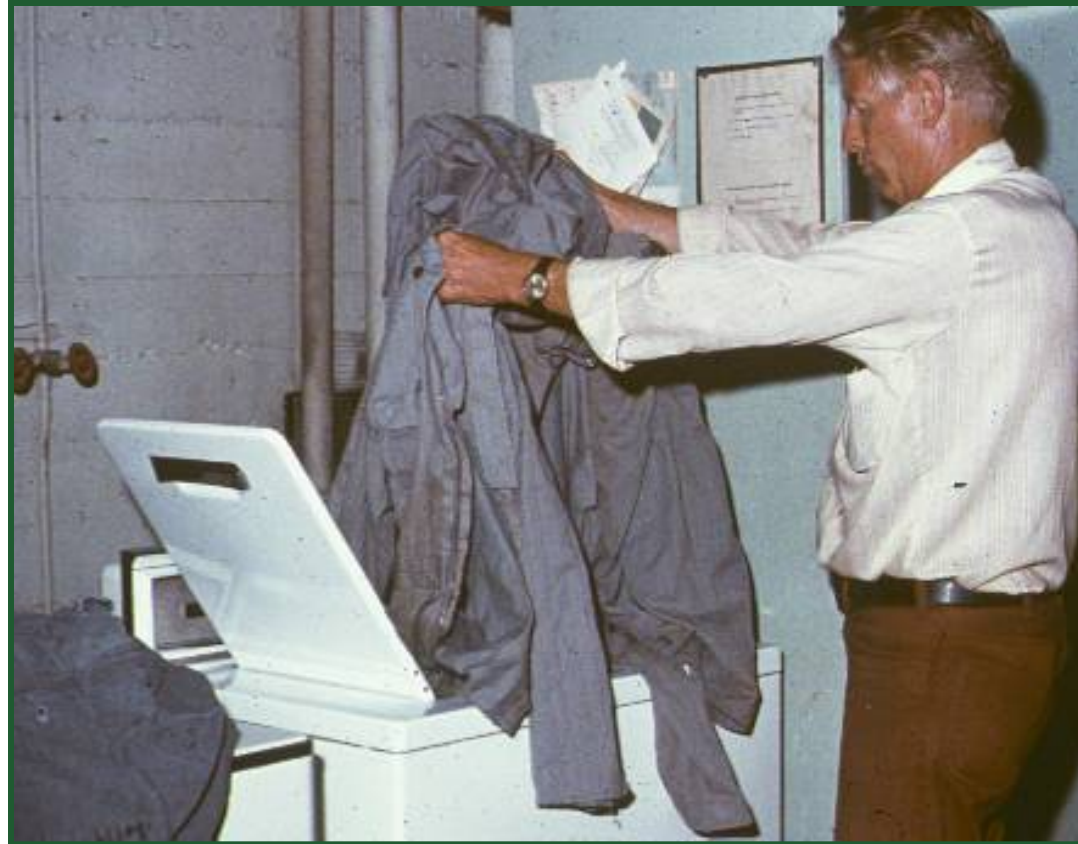


Clean Up!

- ❖ Discard disposables and worn-out items!
- ❖ Wash at the end of each day, including gloves and all PPE
- ❖ Launder pesticide clothing



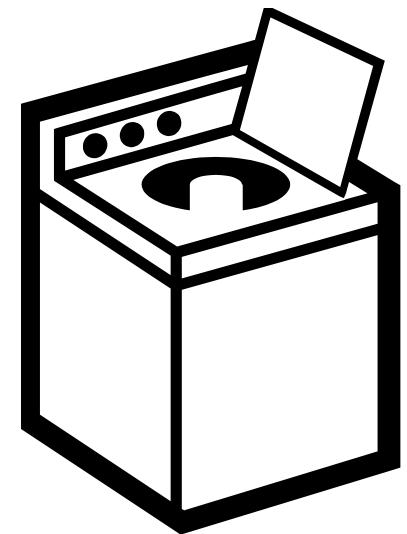
Separate from family clothing



**Wash contaminated clothing
in hot water with detergent**

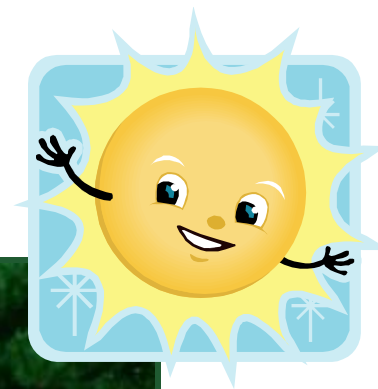
Laundering Pesticide Contaminated Clothing

- ❖ Use heavy-duty liquid detergent for ECs
- ❖ Use **2 cycles** for moderate to heavy contamination
- ❖ Rinse the washer with an “empty load”





Line dry clothing if possible!



**Keep all PPE
separate from
pesticides in
storage!!**



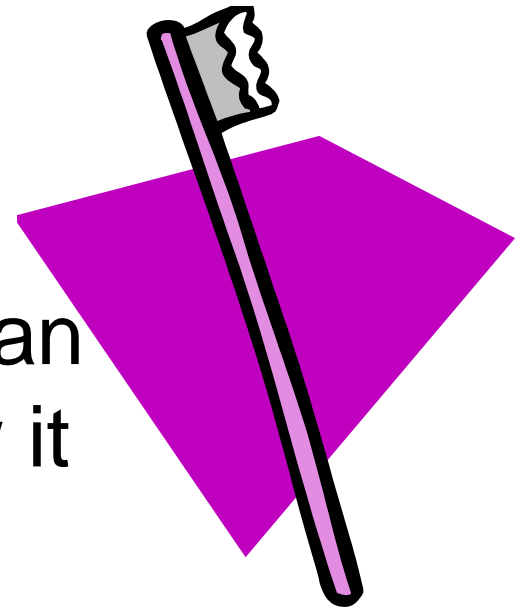
PPE Use

- ❖ Wear adequate PPE
 - ❖ When mixing
 - ❖ When applying
 - ❖ When doing equipment maintenance



PPE Use

- ❖ If a nozzle becomes plugged during an application...
 - ❖ **Do not** remove your PPE!
 - ❖ Use an old toothbrush to clean the nozzle. **Never** try to blow it out with your mouth



Summary

- ❖ Use PPE
- ❖ Use chemical-resistant PPE if necessary
- ❖ Wear, clean, store, & dispose of PPE properly
- ❖ Use eyewear & respirator according to the label
- ❖ Fit test respirators yearly and fit check them before every use
- ❖ Follow the label instructions -- and then some!



CHAPTER 6

Q1. Who must legally follow Personal Protective Equipment instructions on the pesticide label?

1. applicators
2. mixers/loaders
3. early-entry agricultural workers
4. hand-picking harvest crew

A. 1 only

B. 1 and 2 only

C. 1, 2, and 3 only

D. 1, 2, 3, and 4



CHAPTER 6

Q2. A pesticide label may require a respirator be worn for personal protection when handling the pesticide product. Which of the following are types of air-purifying respirators?

1. Chemical cartridge respirators
2. Gas masks
3. Self-contained breathing apparatus
4. Supplied-air respirators

A. 1 and 2 only

C. 3 and 4 only

B. 2 and 3 only

D. 2 and 4 only



CHAPTER 6

Q3. Where does most pesticide exposure occur for pesticide handlers?

- A. Eyes
- B. Hands
- C. Forearms
- D. Feet