Respiratory Protective Devices for Pesticides

Pesticide Education Program

PennState Extension
Licensed farmers, professional pesticide applicators and pesticide businesses in the counties selected for that year are eligible to participate.

Complete the CHEMSWEEP registration form and return to the address shown by the **deadline of February 28**.

CHEMSWEEP will cover the cost of the first 2,000 pounds per participant.

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**2020:** Armstrong, Blair, Cambria, Chester, Clarion, Delaware, Forest, Indiana, Lackawanna, Lancaster, Lebanon, Luzerne, Snyder, Somerset, Union, Venango, Wyoming.

Learning Objectives

• Describe the dangers pesticides can pose to the respiratory system
• Explain the legal and medical requirements for respirator use
• Identify the different types of respirators
• Describe the proper use and care of respirators
• Describe how fit testing is done
• Identify new WPS requirements
Potential Respiratory Problems

• Respiratory system is the quickest and most direct route of entry into the bloodstream
• Can be rapidly transported to the entire body
• Pesticides can cause contact damage to nose, throat, and lungs
Potential Respiratory Problems

• Small particles (less than 10 microns) pass freely to lungs
  - How small is this?
    • Much smaller than the thickness of human hair, which is 100 microns

Micron size visible to the naked eye. >40 microns

Bacteria 1-5 microns

Salt

Hair 100 microns

White blood cell 8 microns
Why wear a respirator?

- Protect your health
- The “Label is the Law”

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**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 A on an EPA chemical-resistance category selection chart.

Mixers, loaders, applicators and other handlers must wear: *long-sleeved shirt, *long pants, *shoes and socks, *chemical-resistant gloves made of any waterproof material

In addition, all handlers must wear: A NIOSH approved respirator with a dust/mist filter with MSHA/NIOSH approval number prefix TC-21C or any N,R,P or HE filter.

Follow manufacturer’s instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product’s concentrate. Do not reuse them.

**OTHER INGREDIENTS**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

* Dithane is a registered trademark of Dow AgroSciences
Personal Limitations

• Can wearing a respirator be hazardous to your health?

• WPS: Adopted OSHA provisions. Medical evaluation required

Illustration: Garo Goodrow, The Pennsylvania State University
Personal Limitations

• Claustrophobic or uncomfortable?
• You must determine personal limitations
• Facial hair may prevent proper seal

Photo: Garo Goodrow, The Pennsylvania State University
Respirators
Provide the key to protecting your respiratory system from airborne chemicals

Photo: Garo Goodrow,
The Pennsylvania State University
Respirator Selection

• Consider the degree of hazard
• Select a respirator designed for the intended use, must be based on label specifications.
  - One pesticide may have different PPE requirements for different activities (applying vs mixing/loading)
Approved Respirators

- Approved by NIOSH
- Numbers beginning with TC (tested and certified)
- Labels indicate which TC cartridge

Photo: Garo Goodrow,
The Pennsylvania State University
• Not NIOSH Approved
• Does not filter gases and vapors
• Only filters particles larger than 10 microns

Not for use with pesticides!

• NIOSH approved
• Does not filter gases and vapors
• Filters particles larger than 0.3 microns

Very little protection from pesticides
## Particulate filter series codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Filter series</th>
<th>Filter type designation</th>
<th>Minimum efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Not resistant to oil</td>
<td>N95, N99, N100</td>
<td>95, 99, 99.97</td>
</tr>
<tr>
<td>R</td>
<td>Resistant for up to 8 hours</td>
<td>R95, R99, R100</td>
<td>95, 99, 99.97</td>
</tr>
<tr>
<td>P</td>
<td>Oil proof</td>
<td>P95, P99, P100</td>
<td>95, 99, 99.97</td>
</tr>
</tbody>
</table>
Self-contained breathing apparatus

Dual cartridge respirator

Full face cartridge respirator

Powered air-purifying respirator
### Comparison of air-purifying respirators

<table>
<thead>
<tr>
<th></th>
<th>Nuisance dust mask</th>
<th>Particulate air filter</th>
<th>Gas mask</th>
<th>Chemical cartridge respirator</th>
<th>Powered air-purifying respirator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NIOSH approved</strong></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Certification markings</strong></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Filters chemical gases and vapors</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Particle size capability</strong></td>
<td>10 microns</td>
<td>0.3 micron</td>
<td>0.3 micron</td>
<td>0.3 micron</td>
<td>0.3 micron</td>
</tr>
<tr>
<td><strong>Positive or negative pressure</strong></td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td><strong>Overall protection</strong></td>
<td>None</td>
<td>Some</td>
<td>Good</td>
<td>Good</td>
<td>Best</td>
</tr>
</tbody>
</table>
How do respirators work?

**Particulate Respirators**
- Filter particles from the air
- Do not protect against chemicals, gases, or vapors
How do respirators work?

Cartridge Respirators
• Chemically purify the air

Photo: Garo Goodrow,
The Pennsylvania State University
How do respirators work?

Self-Contained Breathing Apparatus (SCBA)
- Supply clean air from an outside source

Photo: Garo Goodrow,
The Pennsylvania State University
Proper Fit of Respirators

Dual Cartridge Type

Step 1

• Align release strap
• Hands must be pesticide free
• Protect your skin with disposable coverall with hood

Photo: Garo Goodrow, The Pennsylvania State University
Proper Fit of Respirators

Step 2

- Fasten quick release bottom strap to back of neck
- Place bottom of mouthpiece to chin
- To ensure a tight seal, best to be clean shaven or a light stubble if a proper fit can be achieved

Photo: Garo Goodrow, The Pennsylvania State University
Step 3
• Place top strap on crown of head
• Crown piece strap ensures respirator stays in place despite movement by applicator
Proper Fit of Respirators

Step 4

• Tighten bottom straps
• Do not over tighten

Photo: Garo Goodrow,
The Pennsylvania State University
Proper Fit of Respirators

Step 5
• Tighten top straps
• Do not over tighten

Photo: Garo Goodrow, The Pennsylvania State University
Proper Fit of Respirators

Step 6
- Realign to nose and chin
- Crooked respirators do not protect

Photo: Garo Goodrow, The Pennsylvania State University
Proper Fit of Respirators

Step 7
• Place eye protection over the respirator

Photo: Garo Goodrow, The Pennsylvania State University
Proper Fit of Respirators

Step 8

- Use hood to protect the straps and the back of your head from pesticide exposure

Photo: Garo Goodrow, The Pennsylvania State University
Proper Fit of Respirators

Step 9

- Fit check
- Breathe out while blocking the output valve (positive pressure)

Photo: Garo Goodrow, The Pennsylvania State University
Proper Fit of Respirators

Step 10
- Fit check
- Negative pressure check
- Breathe in while blocking the input valve
Proper Fit of Respirators

Step 10

- Fit check
- Negative pressure check
- Breathe in while blocking the input valve
- Cartridges with large surface area can be blocked by using a clean glove
- Be sure to block both cartridges when performing this negative pressure check

Photo: Garo Goodrow, The Pennsylvania State University
Respirator Care

1. Clean mask after each use (remove cartridges before cleaning)
2. Store mask and cartridges in a sealed plastic bag (away from chemicals)
3. Do NOT hang respirators
4. Replace respirators as suggested by manufacturer
5. Always check for damaged parts before using

Photo: Garo Goodrow, The Pennsylvania State University
WPS Requirements

• Medical evaluation is required prior to use to ensure the handler is physically able to safely wear the respirator
• Handlers must have training in respirator use
• A fit test to ensure the respirator fits correctly
• Employer must keep records of these items for 2 years
• Handlers in enclosed cabs must wear label-specified respiratory protection
  • Exception is if dust/mist respirator type is only type required
Replacing Purifying Elements

Under the WPS, replace particulate filters:

- When breathing becomes difficult
- When the filter is damaged or torn
- When the respirator or pesticide label requires it
- After 8 total hours of use in the absence of any other instructions
Replacing Vapor-Removing Cartridges

Under the WPS, replace vapor removing cartridges:

- When odor, taste, or irritation is noticed
- When the respirator or pesticide label requires it
- When breathing resistance becomes excessive
- After 8 total hours of use in the absence of any other instructions or indications of service life
Questions
Try our online Recertification Courses

Go to: extension.psu.edu/pested/online-recert

• **Six 1-Credit** CORE courses that cost $20 and include topics on:
  o Labeling, formulations, transportation, emergencies, application planning, and application procedures

• **Two 2-Credit** courses that cost $35 are titled:
  o Pest Management and Pesticides in the Environment

• **Two 1-Credit SPANISH** courses that cost $20:
  o Pest Management and Pesticides in the Environment
Discover our program!
Learn more about respirators and connect with our resources.

extension.psu.edu/pesticide-education
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@PSUpested
PSUPestEd
Credits

Presentation prepared by:
Bill Riden, Penn State Extension, Pesticide Education Program

Sources:
EPA-305-B-16-001 Additional Duties for Handler Employers (under worker protection standards).
Special thanks to the Centre County Hazardous Devices Team.

Video imaging provided by Chazzbo Media.

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