

---

# EPA's Worker Protection Standard

---

## Revisions to EPA's WPS Worker and Handler Training

College of Agriculture  
Environmental Health and Safety Office

For:  
College of Agriculture  
Faculty, Staff and Student Workers

February 15, 2016



---

---

---

---

---

---

---

---

## Worker Learning Objectives

---

This training is intended to assist you to:

- Identify key revisions to WPS
- Know where WPS applies
- Identify worker responsibilities
- Identify controls for minimizing exposure to pesticides
- Understand central posting and early entry



---

---

---

---

---

---

---

---

## Program Elements

A small icon showing a group of people, representing the "Background" element.

Background

A yellow diamond-shaped icon with the words "SAFETY FIRST" in black, representing the "Regulatory Changes" element.

Regulatory Changes

A small icon showing a person working in a field, representing the "Worker" element.

Worker

A small icon showing a person wearing protective gear, representing the "Handler" element.

Handler



---

---

---

---

---

---

---

---

Background

## What is a Pesticide?

### FIFRA (40 CFR 162.3)

- Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest and
- Any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.”



Source: Sarah Zukoff, K-State Southwest Research and Extension  
 Plant Protection Product Data: <http://www.greenbook.net/>



10

---

---

---

---

---

---

---

---

---

---

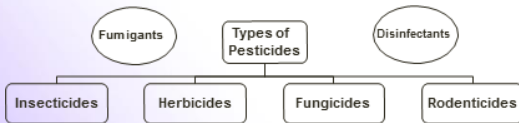
---

---

Background

## Types of Pesticides

'cide = to kill



DRY	LIQUID	OTHER
Dusts	Emulsifiable Concentrates (EC)	Controlled Release
Granular	Ultra Low Volume (ULV)	Repellents
Wettable Powder	Technoconcentrates	Attractants
Soluble Powder	Flowables	Collars & tags
Pellets	MEC	Impregnated products
Feeds formulations	Aerosols	Predator control
Baits	Liquidized gas/Fumigants	Services
Fertilizer Combinations	Solutions	Animal Systemics
Water Dispersible Granule (WDG)	Paints	Oral, dermal, injectable, implant, feed additive
Dry Flowable (DF)		

Source: Sarah Zukoff, K-State Southwest Research and Extension



11

---

---

---

---

---

---

---

---

---

---

---

---

Background

## WPS Purpose and Scope

- To reduce the risks of illness or injury resulting from workers' and handlers' occupational exposures to pesticides.



- Requires employers implement workplace practices designed to reduce or eliminate exposure to pesticides and establish procedures for responding to emergencies.



12

---

---

---

---

---

---

---

---

---

---

---

---

# Requirements and Responsibilities

Background

## Employee

- Read and follow labels and Safety Data Sheets (SDS)
- Follow employer instructions and warnings
- Identify hazards before starting a job
- Take training




---

---

---

---

---

---

---

---

---

---

Background

# WPS applies to...



## Agricultural Worker:

- Hand labor, such as weeding, planting, cultivating and harvesting.
- Related tasks, such as moving or operating irrigation equipment.



## Pesticide Handler:

- Mix, load or apply pesticides.
- Any tasks involving direct contact with pesticides.




---

---

---

---

---

---

---

---

---

---

Background

# WPS applies when...

Any pesticide product is used on an **agricultural establishment** in the production of **agricultural plants**

- **Agricultural establishment** = forest, farm, field site, nursery, or greenhouse



Boom Sprayer



Aerial



Open Cab



Backpack Wand

- **Agricultural plants** = food, feed and fiber plants, trees, turf grass, flowers, shrubs, ornamentals and seedlings




---

---

---

---

---

---

---

---

---

---

Background

## WPS applies if...

- You apply or employ others to apply pesticides for production of agricultural plants on a forest, farm nursery, or greenhouse.
  - That you own or manage
  - Where you hire a contractor for services, including labor contractors
- You operate a business in which you or people you employ perform tasks as a crop advisor on any forest, farm, nursery, or greenhouse.




---

---

---

---

---

---

---

---

## Knowledge Check



Match up the primary duties of the Worker and Handler to the definition of that category.

- A. Agricultural Worker
  - B. Pesticide Handler
- 
- C. Tasks, such as mowing or operating irrigation equipment
  - D. Mix, load or apply pesticides
  - E. Hand labor, such as weeding, planting, cultivating and harvesting
  - F. Any tasks involving direct contact with pesticides

**ANSWER:**




---

---

---

---

---

---

---

---

## Program Elements



Background



Regulatory Changes



Worker



Handler




---

---

---

---

---

---

---

---

## Key Revisions to WPS



**Inform** workers and handlers about potential exposure to pesticides

- Annual training - no grace period for workers
- Display and provide application information and safety data sheets (SDS)
  - Can be requested by worker/handler, treating medical personnel or designated representative
- Post signs if Restricted Entry Interval (REI) > 48 hours (outdoor applications) or 4 hours for greenhouses




---

---

---

---

---

---

---

---

## Key Revisions to WPS

**Protect** workers, handlers and other people from exposure to pesticide

- If labeling requires respirator for handler, provide medical evaluation, fit testing, and respirator training
- Application exclusion zone during applications
- Handlers and early-entry workers must be 18 years old




---

---

---

---

---

---

---

---

## Key Revisions to WPS

**Mitigate** any pesticide exposures that workers or handlers receive

- Provide routine decontamination supplies for workers, handlers, and early-entry workers
- Provide eyewash system for mixers/loaders if labeling requires protective eyewear




---

---

---

---

---

---

---

---

# Knowledge Check



What are the three key revisions to the Worker Protection Standard that goes into effect this year? Choose all that apply.

- A. Orient, Decontaminate, and Abate
- B. Inform, Protect, and Mitigate
- C. Educate, Label, and Isolate
- D. Train, Post, and Mitigate

**ANSWER:**



---

---

---

---

---

---

---

---

Regulatory Changes

## Implementation Timeline

Date	Milestone
September 28, 2015	Revised WPS final rule signed and announced.
November 2, 2015	Revised WPS final rule published in the <i>Federal Register</i> .
January 1, 2016	Revised WPS final rule becomes effective. During 2016, compliance is required with the existing WPS requirements.
January 2, 2017	Compliance is required with <u>most</u> of the <u>revised</u> WPS requirements.
January 1, 2018	Compliance is required with <u>all</u> of the <u>revised</u> WPS requirements. Last three requirements: <ul style="list-style-type: none"><li>• Cover new content in worker and handler training.</li><li>• Include new content on pesticide safety information display.</li><li>• Handlers suspend applications if anyone is in the application exclusion zone.</li></ul>



---

---

---

---

---

---

---

---

## Program Elements



Background



Regulatory Changes



Worker



Handler



---

---

---

---

---

---

---

---

## Worker Training Elements

1. Descriptions of where and in what form pesticides may be encountered during work activities.
2. Hazards of pesticides from toxicity & exposure:
  - Acute effects
  - Chronic effects
  - Delayed effects
  - Sensitization




---

---

---

---

---

---

---

---

## Worker Training Elements (cont.)

7. Routine and emergency decontamination procedures (including eye flush techniques)
8. Hazards from chemigation (application of chemicals in irrigation waters) and drift
9. Hazards from residues on clothing
10. Warnings on taking pesticides or pesticide containers home.




---

---

---

---

---

---

---

---

## Worker Training Elements (cont.)

11. Requirements of WPS designed to reduce the risks of illness or injury resulting from workers' occupational exposure to pesticides, include:
  - Application and entry restrictions
  - Design of warning signs
  - Posting of warning signs
  - Oral warnings
  - Availability of specific information about applications
  - Protection against retaliation




---

---

---

---

---

---

---

---

## Knowledge Check



Which of the following is not a worker training component as specified by the WPS?

- A. Hazards of pesticides from toxicity and exposure
- B. Calibration of application equipment
- C. Signs and symptoms of pesticide exposure
- D. Hazards from residues on clothing

**ANSWER:**



10

---

---

---

---

---

---

---

---

## Knowledge Check



Which of the following is not a worker training component as specified by the WPS?

- A. Determining proper harvest moisture contents
- B. Hazards from pesticide chemigation and drift
- C. Routes through which pesticides enter the body
- D. Warnings on taking pesticides home

**ANSWER:**



11

---

---

---

---

---

---

---

---

Worker Training

## SENSOR Pesticide Surveillance Program<sup>1</sup>

1,009 Cases, Acute Occupational Pesticide Illness (6 States)

### How Workers were Exposed:

- 25% = During application process (applying, mixing, loading, transport, disposal, or equipment maintenance)
- 67% = During routine work activities, such as weeding, planting, cultivating, and harvesting that did not involve handling pesticides
- 8% = Unknown

<sup>1</sup>Calvert, G.M. et al. (2004). Acute occupational pesticide-related illness in the US, 1998-1999: Surveillance findings from the SENSOR pesticides program. *American Journal of Industrial Medicine*, 45, 14-23.



12

---

---

---

---

---

---

---

---



Worker Training

## WSDH Annual Report<sup>1</sup>

### Washington State Greenhouse and Nursery Pesticide Exposure: 1995-1999

- 37% = Residues
- 24% = Applications
- 14% = Drift
- 10% = Mixing or loading
- 7% = Cleaning/fixing equipment
- 7% = Other



<sup>1</sup>Washington State Department of Health 2000-2001 Annual Report



18

---

---

---

---

---

---

---

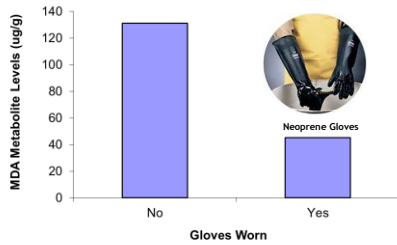
---

---

---

Worker Training

### Protective Gloves and Malathion Metabolite Concentration in Urine of Farm Workers



Bradman, A., et al. (2008). Community-based intervention to reduce pesticide exposure to farmworkers and potential take-home exposure to their families. *Journal of Exposure Science and Environmental Epidemiology*.



19

---

---

---

---

---

---

---

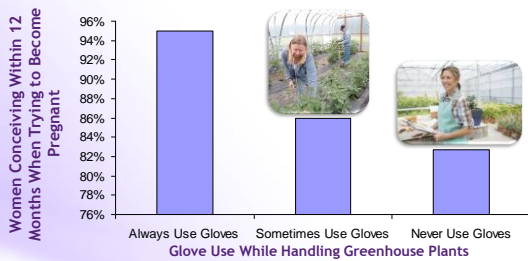
---

---

---

Worker Training

### Ability to Become Pregnant: Female Workers



Abell, A., Juul, S., & Bonde, J. P. (2000). Time to pregnancy among female green-house workers. *Scandinavian Journal of Work, Environment & Health*, 26(2), 131-136.



20

---

---

---

---

---

---

---

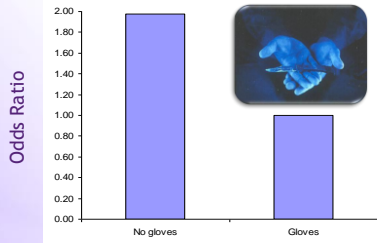
---

---

---

Worker Training

### Cancer in Children of Pesticide Applicators: Parent's Use of Chemically-Resistant Gloves



Flower, K.B., et al. (2004). Cancer risk and parental pesticide application in children of agricultural health study participants. *Environmental Health Perspectives*, 112, 631-635.



18

---

---

---

---

---

---

---

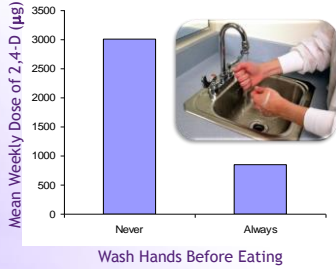
---

---

---

Worker Training

### Hand Washing Practices and Urine Concentration of 2,4-D in Turf Pesticide Applicators



Harris, S.A., et al. (2002). Development of models to predict dose of pesticides in professional turf applicators. *Journal of Exposure Analysis and Environmental Epidemiology*, 12, 130-144.



19

---

---

---

---

---

---

---

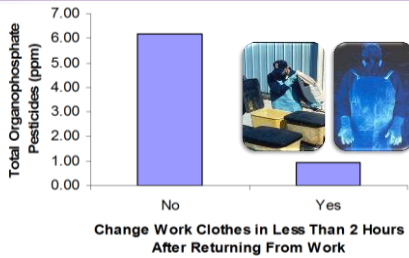
---

---

---

Worker Training

### Pesticide Residue in House Dust of Agricultural Families



McCaughey, L.A., et al. (2003). Pesticide exposure and self reported home hygiene: Practices in agricultural families. *American Association of Occupational Health Nurses Journal*, 51, 113-119.



20

---

---

---

---

---

---

---

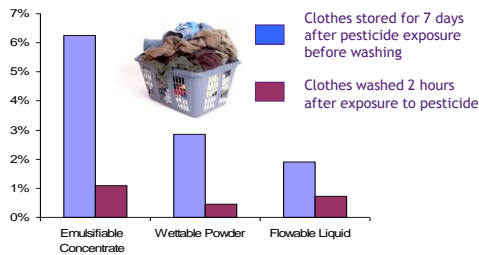
---

---

---

## Effect of Wash Delay on Carbaryl Residue in Polyester/Cotton Fabric

Percent Original Active Ingredient Remaining in Fabric After Washing



Fleeker, J. R., et al. (1988). Effect of formulation on removal of carbaryl and chlorothalonil from apparel fabrics by dry cleaning, aqueous extraction, and vaporization. In S. Z. Mansdorf, et al. (Eds.), *Performance of protective clothing: Second symposium, ASTM STP 989* (pp. 715-726). Philadelphia: ASTM.



---

---

---

---

---

---

---

---

## Knowledge Check



When people are accidentally poisoned by pesticides, it is usually because they...

- A. Got pesticides in their eyes, and mucous membranes
- B. Got pesticides on their skin
- C. Swallowed pesticides
- D. Breathed in pesticides

**ANSWER:**



---

---

---

---

---

---

---

---

## Acute vs. Chronic Effects

Acute effects happen suddenly, normally from a single exposure. Acute health effects are often reversible.

Chronic effects occur when repeated exposures over long periods of time or when the body takes a long time to develop a response after a brief exposure. Chronic health effects are often irreversible.

Distinction	Acute	Chronic
Cause	Normal response to injury or medical condition	Often unknown or unrelated to medical findings
	Signal of tissue damage or underlying medical condition	Pain is often not a signal of harm
Duration	Short term	Lasts longer than three months
	Pain reduces as body heals	Pain often continues even after healing
Treatment	Often responds to traditional medical treatment	Minimal or no response to traditional medical treatment
Quality of life	Does not affect long term quality of life	Often interferes with quality of life including sleep, work, recreational activities
	May or may not affect mood	Often accompanied by depression, anger and frustration.



---

---

---

---

---

---

---

---

# Take-Home Contamination<sup>1</sup>

Two children in Florida, a brother and sister, died after playing on a swing made from a burlap sack that was heavily contaminated with parathion.



<sup>1</sup>DHHS (NIOSH) Pub. No. 95-123



10

---

---

---

---

---

---

---

---

## Knowledge Check



What is an acutely toxic chemical?

- A. An inert chemical
- B. The chemical is toxic only if you drink it
- C. The chemical will harm you only after years of exposure
- D. The chemical can harm you in a single dose over a short period of time.

**ANSWER:**



11

---

---

---

---

---

---

---

---

# How do Pesticides Affect the Body?

It depends on several factors, such as:

- How the chemical enters the body - inhaled, absorbed or ingested
- The physical form of the chemical - solid, liquid, or gas
- The amount of chemical that actually enters the body - the dose
- How toxic or poisonous the chemical is



12

---

---

---

---

---

---

---

---

# Biological Effects of Common Pesticides

## Organophosphates and Carbamates

- Widely used insecticides
- Cholinesterase inhibition:
  - Interferes with nervous system
  - Causes contraction of smooth muscles; secretion of glands; twitching/weakness/ paralysis of skeletal muscles; sensory and behavioral disturbances; respiratory failure
- Victim may die of respiratory failure and excessive fluid in the lungs




---

---

---

---

---

---

---

---

---

---

# Allergic Sensitizations

## Skin Symptoms

- May include swelling, redness, itching, pain, and blistering

## Respiratory Symptoms

- May include wheezing, difficulty in breathing, chest tightness, coughing and shortness of breath, and in some cases, respiratory sensitization can produce severe asthma attacks.




---

---

---

---

---

---





---

---

---

---

# Common Routes of Exposure

 <p>If the material is inhaled, the particles or mist settles in the respiratory tract. Some chemicals settle in the nose and throat, some go deeper into the lungs. The chemicals that go deeper in the lungs the potential for more damage. Fine dust usually goes deep into the lungs.</p>	 <p>If the chemical contacts the skin, some chemicals are absorbed through the skin more easily than others. Also, some chemicals will have a direct effect on the skin without being absorbed through the skin. This is another good reason to wash your hands before eating or drinking.</p>	 <p>If the chemical is ingested, some chemicals can be very readily absorbed.</p>	 <p>If the chemical is splashed into the eyes or the hands contact the eyes, it can damage the eyes. The result, could be loss of sight.</p>
--	---	--	---




---

---

---

---

---

---

---

---

---

---

## Knowledge Check



What are the four common routes of entry of chemicals into the body? Choose all that apply.

- A. Ears, eyes, contact lens, and mouth
- B. Nose, mouth, skin, and lungs
- C. Ingestion, swallowing, inhaling, and exhaling
- D. Ingestion, inhalation, and skin or eye absorption

ANSWER:



---

---

---

---

---

---

---

---

Worker Training

## Dermal Exposure

- Dermal is most common pesticide exposure
- The most common route is through the hands and forearms



- The importance of PPE and handwashing

Source: Sarah Zukoff, K-State Southwest Research and Extension



---

---

---

---

---

---

---

---

Worker Training

## Dermal Exposure

- Formulations vary in their ability to be absorbed through the skin. Emulsifiable concentrates are more readily absorbed than other formulations.
- All formulations can be absorbed in clothing, thereby becoming a path to skin exposure.



Source: Sarah Zukoff, K-State Southwest Research and Extension



---

---

---

---

---

---

---

---

Worker Training

Do you recognize this area?



10

---

---

---

---

---

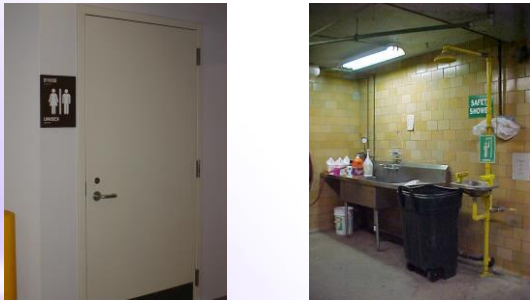
---

---

---

Worker Training

Decontamination Area



11

---

---

---

---

---

---

---

---

Worker Training

Application Records



12

---

---

---

---

---

---

---

---

## Emergency Medical Care

### EMERGENCY

Call 911

Via Christi Hospital Emergency Room  
Corner of Kimball & College Ave.

### NON-EMERGENCY

Occupational Health - Via Christi Therapy  
Center/Via Christi Hospital  
315 Seth Child Road/Kimball & College Ave.



---

---

---

---

---

---

---

---

## Summary: Protect Yourself

- Keep out of treated or restricted areas.
- Wash before eating, drinking, using chewing gum or tobacco, or using the toilet.
- Wear work clothing that protects your body from pesticide residues.
- Wash/shower with soap and water, shampoo hair, and put on clean clothes after work.
- Wash work clothes separately from other clothes before wearing them again.
- If pesticides are spilled or sprayed on your body:
  - Wash immediately using the nearest clean water.
  - As soon as possible, shower, shampoo, and change into clean clothes.



---

---

---

---

---

---

---

---

## Conclusion

- This concludes the worker presentation.
- To receive your Certificate of Completion, you must complete the 10-question WPS Worker quiz. Your worker verification card will be send to you via campus mail.
- Please contact John H. Gamble at [jhgamble@ksu.edu](mailto:jhgamble@ksu.edu) if you have questions or need additional information.
- Other sources of information include:  
<http://www.epa.gov/pesticide-worker-safety>;  
<http://www.ksre.k-state.edu/agsafe>



---

---

---

---

---

---

---

---



## Program Elements



Background



Regulatory Changes



Worker



Handler



---

---

---

---

---

---

---

---

## Handler Learning Objectives

This training is intended to assist you to:

- Identify handler responsibilities
- Follow safe procedures when handling pesticides
- Select PPE for handling pesticides
- Understand application record reporting
- Define and describe some signs and symptoms of heat stress



---

---

---

---

---

---

---

---

Handler Training

## Handler Training Elements

1. Description of information on pesticide labeling including safety information
2. Hazards of pesticides from toxicity and exposure:
  - Acute effects
  - Chronic effects
  - Delayed effects
  - Sensitization



---

---

---

---

---

---

---

---

## Handler Training Elements (cont.)

- 3. Routes through which pesticides can enter the body
- 4. Signs and symptoms of pesticide poisoning
- 5. Emergency first aid for pesticide injuries & poisonings
- 6. How to obtain emergency medical care



---

---

---

---

---

---

---

---

## Handler Training Elements (cont.)

- 7. Routine and emergency decontamination procedures
- 8. Use of Personal Protective Equipment (PPE)
- 9. Prevention, recognition, and treatment of heat-related illness



---

---

---

---

---

---

---

---

## Handler Training Elements (cont.)

- 10. Safe handling, transporting, storing and proper disposal of pesticides, including spill cleanup procedures
- 11. Environmental concerns – drift, runoff, habitat wildlife hazards
- 12. Warnings about taking pesticides and their containers home



---

---

---

---

---

---

---

---

# Knowledge Check



Which of the following is **not** a handler training component as specified by the WPS?

- A. Drift, runoff, and wildlife concerns
- B. Signs and symptoms of pesticide poisoning
- C. Warnings about taking pesticides home
- D. Learning pesticide modes of action

**ANSWER:**




---

---

---

---

---

---

---

---

---

---

---

---

Handler Training

## Pesticide Recordkeeping Requirements

Pesticide handlers are required to maintain records of their pesticide use applications in the field or in the greenhouses.




---

---

---

---

---

---

---

---

---

---

---

---

Pesticide Application Record for Kansas State University Horticulture Extension Order No. 21029

Year	Date/MODA	Time*	Crop or Commodity	Location*	Active Ingredient Trade or Product Name	EPA Registration Number*	# of Units or Acres	Total Amount of Product (Gals, lbs, etc.) (Gals, lbs, etc.)	Application Information	Duration (HOURS)	Exposure (Min/Dur/Time)
2004	1-10-04			102 C 102 D	Hydrocar Sivicide	10 299-1		1 1/4 oz/gal 8 gal	Lea. Wickert	0	1-6-04
	4:50-5:00				Zenon TBI				(WSP)		3:00 PM
	1-10-04			104 E 104 F 104 G	Comdiferid Mastekon II	31 26-58 5987		48 gal 1 gal	Lea. Wickert	12 HR	1-7-04 4:00 AM
	1-10-04			104 J	Hydrocar Sivicide	10 299-1		40 gal 4 gal	Lea. Wickert	0	1-6-04
	3:15-3:45			104 J	Zenon TBI			1.5 oz/gal 10 gal	Lea. Wickert	4 HR	3:15-3:45
	1-9-04			104 J 104 K	Picoflinc Ultra-Fine	864-23- 499		1.5 oz/gal 10 gal	Lea. Wickert	4 HR	1-9-04
	10:00-11:00			104 E	Sivicide A+B	62719-281		1.5 oz/gal 3 gal	Lea. Wickert	4 HR	1-12-04
	1-12-04			104 E	Comdiferid	31 26-58		1 gal	Lea. Wickert		8:00-8:50
	4:00-4:30			104 E 104 F 104 G	Comdiferid Mastekon II	31 26-58 5987		18 gal 1 gal	Lea. Wickert	12 HR	1-14-04
	1:30-4:00			104 J 104 K	Hydrocar Sivicide	10 299-1		1 gal	Lea. Wickert		1:30-4:00
	1-10-04			102 B	Sivicide A+B	62719- 281		1/2 gal 1 gal	Lea. Wickert	4 hr	1-10-04
	1:30-2:30				Comdiferid			1 gal	Lea. Wickert		5:30 PM
	1-16-04			104 L 104 M 104 N	Triadimenol Bayerlon	699 216-1		1/4 gal 3 gal	Lea. Wickert	12 hr	1-17-04
	5:00-6:15				Comdiferid			3 gal	Lea. Wickert		5 AM
	1-20-04			104 J 104 K	Hydrocar Sivicide	10 299-1		1.5 oz/gal 2 gal	Lea. Wickert	4 hr	1-20-04
	10:15-11:15			104 J 104 K	Hydrocar Sivicide	10 299-1		1.5 oz/gal 2 gal	Lea. Wickert	4 hr	4:00 PM
	1-20-04			104 J 104 K	Hydrocar Sivicide	10 299-1		1.5 oz/gal 2 gal	Lea. Wickert	12 hr	1-21-04
	5:20-6:30				Comdiferid			1.5 gal	Lea. Wickert		5 AM

\*Required by Pesticide Protection Handbook, Central Area Information © GEMPLEX® Inc. 1993 To order call 1-800-343-9473 Order No. 21029

# Chemical Label Pictograms<sup>1</sup>

<b>Health Hazard</b>  <ul style="list-style-type: none"> <li>• Carcinogen</li> <li>• Mutagenicity</li> <li>• Reproductive Toxicity</li> <li>• Respiratory Sensitizer</li> <li>• Target Organ Toxicity</li> <li>• Aspiration Toxicity</li> </ul>	<b>Flame</b>  <ul style="list-style-type: none"> <li>• Flammables</li> <li>• Pyrophorics</li> <li>• Self-Heating</li> <li>• Emits Flammable Gas</li> <li>• Self-Reactives</li> <li>• Organic Peroxides</li> </ul>	<b>Exclamation Mark</b>  <ul style="list-style-type: none"> <li>• Irritant (skin and eye)</li> <li>• Skin Sensitizer</li> <li>• Acute Toxicity (harmful)</li> <li>• Narcotic Effects</li> <li>• Respiratory Tract Irritant</li> <li>• Hazardous to Ozone Layer (Non-Mandatory)</li> </ul>
<b>Gas Cylinder</b>  <ul style="list-style-type: none"> <li>• Gases under Pressure</li> </ul>	<b>Corrosion</b>  <ul style="list-style-type: none"> <li>• Skin Corrosion/ burns</li> <li>• Eye Damage</li> <li>• Corrosive to Metals</li> </ul>	<b>Explosion Bomb</b>  <ul style="list-style-type: none"> <li>• Explosives</li> <li>• Self-Reactives</li> <li>• Organic Peroxides</li> </ul>
<b>Flame over Circle</b>  <ul style="list-style-type: none"> <li>• Oxidizers</li> </ul>	<b>Environment (Non-Mandatory)</b>  <ul style="list-style-type: none"> <li>• Aquatic Toxicity</li> </ul>	<b>Skull and Crossbones</b>  <ul style="list-style-type: none"> <li>• Acute Toxicity (fatal or toxic)</li> </ul>

1 OSHA: [www.osha.gov/Publication/HazComm\\_Quickcard\\_Pictogram](http://www.osha.gov/Publication/HazComm_Quickcard_Pictogram)




---

---

---

---

---

---

---

---

---

---

---

---

# Chemical Labeling and Other Warnings

**Pictograms** →

**Signal word** →

**Hazard statements** →

**Precautionary statements** →

**Product identifiers** →

**Supplier identity** →




---

---

---

---

---

---

---

---

---

---

---

---

# Safety Data Sheet: Roundup

SDSs – What information is in them?

**SDS Sections**  
 Identification of the Substance,  
 Preparation and the Company

**Example Information**  
 Name: Roundup PowerMax,  
 Supplier Contact Information



Information on Ingredients

CAS No. 70901-12-1

Hazard Identification

Irritating to Eyes

First Aid Measures

Language Specific to Inhalation,  
 Ingestion, Skin and Eyes Exposures

Fire Fighting Measures

Language Specific to  
 Extinguishment, Explosion Hazards,  
 Protective Measures




---

---

---

---

---

---

---

---

---

---

---

---

## Safety Data Sheet: Roundup

SDS Sections	Example Information
Accidental Release Measures	Use PPE as directed, Avoid Direct Contact, Prevent Soil Contamination
Handling and Storage	Avoid Eye, Skin and Clothing Contact, Wash Hands, Keep only in Original Container
Exposure Control and Personal Protection	None Established; Ventilation; PPE
Physical and Chemical Properties	Liquid, Amber-Brown Color, Odorless
Stability and Reactivity	Stable under Normal Conditions




---

---

---

---

---

---

---

---

---

---

## Safety Data Sheet: Roundup

SDS Section	Example Information
Toxicological Information	NOAEL Toxicity: >20,000 mg/kg Diet
Ecological Information	LC <sub>50</sub> = 5.2 mg/l (Bluegill Sunfish)
Disposal Consideration	Keep out of Drains, Sewers, Ditches and Water Ways; Triple Rinse Container
Transportation Information	Non-Hazardous under DOT
Regulatory Information	Labels: Surfactant(s)
Other Information Included	NFPA: Health 1; Flammability 1; Instability 1




---

---

---

---

---

---

---

---

---

---

## PPE to Consider

Here's some other Personal Protective Equipment (PPE) you should consider wearing when applying pesticides:

- ✓ Boots or shoe covers
- ✓ Coveralls
- ✓ Hood or wide brimmed hat
- ✓ Apron
- ✓ Protective eyewear
- ✓ Respirator
  - Medical exam
  - Fit tested
- ✓ Protective clothing
  - Long sleeve shirt
  - Long pants

- Face Shield
- Respirator
- Chemical Resistant Apron
- Chemical Resistant Rubber Gloves
- Chemical Resistant Coveralls
- Chemical Resistant Rubber Boots



Best Management Practices: Personal Protective Equipment




---

---

---

---

---

---

---

---

---

---

# Gloves

- No single glove will protect against every chemical exposure - check label
- Each manufacturer's gloves will have difference breakthrough times, so again check the label
- What about leather gloves?
- Demonstration
  - Remove jewelry
  - Check for leaks
  - Proper removal
- Should I reuse a pair of gloves?



Review of Glove Materials




---

---

---

---

---

---

---

---

---

---

# EPA Chemical Resistance Categories for Gloves

- ✓ High: Highly chemical-resistant. Clean or replace PPE at end of each days work period. Rinse off pesticides at rest breaks.
- ✓ Moderate: Moderately chemical-resistant. Clean or replace PPE within an hour or two 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.



Source: Sarah Zukoff, K-State Southwest Research and Extension




---

---

---

---

---

---

---

---

---

---

# Latex Gloves

Do not use latex gloves for pesticide handling



Source: Sarah Zukoff, K-State Southwest Research and Extension




---

---

---

---

---

---

---

---

---

---

# Natural Rubber and PVC Gloves

Slight or Moderate Chemical Resistance

- ✓ Does not hold up well in organic solvents, oils, greases, kerosene or gasoline.



Source: Sarah Zukoff, K-State Southwest Research and Extension




---

---

---

---

---

---

---

---

---

---

# Neoprene and Nitrile Gloves

- ✓ Excellent chemical resistance from exposure to organic and inorganic acids, organic solvents, oils, greases and petrochemicals.
- ✓ Designed for chemical resistance to petrochemicals, oils, greases, pesticides and other agricultural chemicals.

Neoprene



Nitrile



Source: Sarah Zukoff, K-State Southwest Research and Extension




---

---

---

---

---

---

---

---

---

---

# Glove Summary

To avoid secondary exposure before removing the gloves:

- Thoroughly wash the gloves with soap and water and rinse with a large amount of water.
- Then remove the gloves, and wash your hands and forearms thoroughly with soap and water




---

---

---

---

---

---

---

---

---

---

## Knowledge Check



Which of the following gloves provide excellent chemical resistance when I am handling a pesticides? Choose all that apply.

- A. Neoprene
- B. PVC
- C. Latex
- D. Nitrile
- E. Natural rubber

**ANSWER:**



---

---

---

---

---

---

---

---

Handler Training

## Coverall Summary

Disposable or limited use coveralls are sold under brand names such as Tyvek®, Pro/Shield®, Kleenguard®.

Non-woven fabrics have a random orientation of fibers, which eliminates direct paths that pesticides can follow through the fabric.



---

---

---

---

---

---

---

---

Handler Training

## Boots Summary

- Wearing unlined, chemical-resistant footwear is required for some pesticides and is a sensible practice for all pesticide use.
- Select non-skid boots of PVC, natural rubber, or neoprene.



---

---

---

---

---





---

---

---



**CHEMREST Data Sheet**  
 For: **ROUNDUP**  
 (CONCENTRATED)

	Heavy Exposure Breakthrough Time in Minutes	Limited Exposure Breakthrough Time in Minutes
 <b>Best@ Neoprene 6780</b>	15	NT
 <b>Hustler™ 725R PVC</b>	30	NT
 <b>Nitri-Solve® 727 Nitrile</b>	>480	>240
 <b>N-DEX Plus® 8005 Nitrile Exam Glove</b>	>480	>240

---

---

---

---

---

---

---

---

### Knowledge Check



Which of the following gloves will protect me if I am handling Roundup? Choose all that apply.

- A. Neoprene
- B. PVC
- C. Thick nitrile
- D. Thin nitrile exam gloves
- E. Any waterproof glove is okay

**ANSWER:**




---

---

---

---





---

---

---

---

**CHEMREST Data Sheet For:**  
**ACETONE**

	Heavy Exposure Breakthrough Time in Minutes	Limited Exposure Breakthrough Time in Minutes
 <b>Best@ Neoprene 6780</b>	35	43
 <b>Hustler™ 725R PVC</b>	7	14
 <b>Nitri-Solve® 727 Nitrile</b>	3	18
 <b>N-DEX Plus® 8005 Nitrile Exam Glove</b>	NR	6

---

---

---

---

---

---

---

---

## Knowledge Check



Which of the following gloves will protect me if I am handling a pesticide containing acetone? Choose all that apply.

- A. Neoprene
- B. PVC
- C. Thick nitrile
- D. Thin nitrile exam gloves
- E. Any waterproof glove is okay

**ANSWER:**



---

---

---

---

---

---

---

---

Handler Training

## Respirators



---

---

---

---

---

---

---

---

Handler Training

## Other PPE



Donning: Personal Protective Equipment



---

---

---

---

---

---

---

---

## Mixing and Loading

Pesticide handlers are often exposed when they mix and load pesticides. Can you think of any reasons why you need to be especially careful when during mixing and loading operations?

- Back flow prevention
- Protect the environment
- Follow label directions
- Open containers
- Wear PPE




---

---

---

---

---

---

---

---

---

---

## Transporting Pesticides

If you have to move pesticides from one place to another in a pickup or car, what are some precautions you need to take?



- Keep up-to-date spill supplies on hand
- Don't put pesticides in with people, animals, food, or clothing
- Put them in the back of a truck or in a trunk and
- Secure containers




---

---

---

---

---

---

---

---

---

---

## Leaking Pesticide Containers

An agricultural worker became ill in the cab of a tractor while applying pesticides. He had placed the pesticide containers in the enclosed cab of the tractor, where they leaked from the container.




---

---

---

---

---

---

---

---

---

---

## Knowledge Check



If you have to move pesticides from one place to another in a pickup or car, what are some precautions you need to take? Choose all that apply.

- A. Make sure you have spill clean-up materials with you.
- B. While it may be tempting to put pesticides inside your car or truck, put them in back of the pickup or in the trunk of the car.
- C. Don't put pesticides with people or animals, nor near feed.
- D. Secure the containers, so they don't fall over or roll around.

**ANSWER:**



16

---

---

---

---

---

---

---

---

Handler Training

## Post Handling Tasks

When you are finished with a pesticide handling job, what are the safe practices for taking off your equipment, cleaning up, and putting things away?



Doffing Poor Example: [Why Decontaminate?](#)  
Summary: [Selection and Use of PPE](#)



17

---

---

---

---

---

---

---

---

Handler Training

## Pesticide Storage

When storing pesticides, keep them:

- In a locked cabinet or locked room
- In their original labeled containers
- With the lids on tight
- On shelves with lips or other means to keep the containers from tipping and spilling.



Inform supervisor of leaks or spill immediately!



18

---

---

---

---

---

---

---

---

## Knowledge Check



When you are storing pesticides, you should not keep them:

- A. In a locked cabinet or room
- B. In their original, labelled containers
- C. On a conveniently located shelf
- D. With other compatible chemicals

**ANSWER:**



---

---

---

---

---

---

---

---

Handler Training

## Control and Contain Spills

Some basic procedures for managing spills:

- Read the label
- Use the right PPE and clean-up materials
- If you don't know what to do, call for help
- If it is a large spill, send someone for help
- **FIRST**, control the spill by stopping it
  - Upright container so it no longer spills
  - Put smaller containers into larger ones
- Create a perimeter
- Avoid contact with the drift
- Evaluate people from downwind areas
- Stop the spill from spreading



Source: Sarah Zukoff, K-State Southwest Research and Extension



---

---

---

---

---

---

---

---

Handler Training

## Clean-up the Spill

For Liquid Spills:

- Spread absorbent materials over entire spill; absorbent flakes, fine sand, vermiculite, clay, pet litter
- Avoid using sawdust on strong oxidizers
- Pillows, tubes, or pads



For dust and granular spills:

- Lightly mist with water and cover with a tarp
- Add absorbent material
- Add bleach or hydrated lime to neutralize area
- Dispose of pesticide containers (Triple Rinse)
- Dispose of waste: Call EH&S



Source: Sarah Zukoff, K-State Southwest Research and Extension



---

---

---

---

---

---

---

---

# Pesticide Fires

## Chemical Characteristics:

- Pesticides may give off highly toxic vapors or smoke that may harm firefighters, nearby residents, animals, or plants
- Residues may be present in debris and soil
- Runoff from the fire site may be highly toxic



## Actions:

- Call 911
- Contain with fog, foam, or dry powder if possible
- Contain the water and spilled chemicals
- Using water may lead to widespread contamination
- Build dikes to contain water if necessary



Source: Sarah Zukoff, K-State Southwest Research and Extension




---

---

---

---

---

---

---

---

---

---

---

---

# People, Animals and Water Supplies

What precautions can you take to make sure your pesticides don't get on people, animals, or water supplies?




---

---

---

---

---

---

---

---

---

---

---

---

# Knowledge Check



If you are responsible for cleaning up a pesticide spill, what should you not do?

- A. Read the label
- B. Contain by stopping the spill, then control the spill
- C. If you don't know what to do, call for help
- D. Make sure you have the right PPE and clean-up materials
- E. Dispose of pesticide container(s)
- F. Dispose of waste

**ANSWER:**




---

---

---

---

---

---

---

---

---

---

---

---

## Heat-Related Illnesses

- Heat Cramps
- Heat Exhaustion
- Heat Stroke



---

---

---

---

---

---

---

---

## Heat Cramps

- Caused by excessive loss of electrolytes
- Early warning signs of heat stress
  - Painful cramps usually in legs or abdomen
- Stop activity, hydrate, rest in cool place
- Get medical attention if condition continues



---

---

---

---

---

---

---

---

## Heat Exhaustion

- The body's response to excessive water and electrolyte loss
- Stop activity and seek treatment immediately



---

---

---

---

---

---

---

---

## Heat Stroke

- The body's cooling mechanism shuts down
- 50% that reach the heat stroke stage die even with medical attention
- Seek immediate medical attention



---

---

---

---

---

---

---

---

## Worker Responsibility

- Follow instructions of the Industrial Hygienist and health care professionals
- Be watchful for symptoms (self and others)
- Properly hydrate (before, during and after)
- Get adequate rest
- Avoid alcohol, unnecessary medication, and caffeine



---

---

---

---

---

---

---

---

## Knowledge Check



Match up risk factors for heat-related illnesses.

- A. Job
- B. Human
- C. Environment
- C. Poor physical condition
- D. Work intensity
- E. Humidity
- F. Lack of acclimatization

**ANSWER:**



---

---

---

---

---

---

---

---



## Conclusion

- This concludes the handler presentation.
- To receive your Certificate of Completion, you must complete the 10-question WPS Handler quiz. Your handler verification card will be send to you via campus mail.
- Please contact John H. Gamble at [jhgamble@ksu.edu](mailto:jhgamble@ksu.edu) if you have questions or need additional information.
- Other sources of information include:  
<http://www.epa.gov/pesticide-worker-safety>;  
<http://www.ksre.k-state.edu/agsafe>



---

---

---

---

---

---

---

---