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# G85-758 Protective Clothing and Equipment for Pesticide Appliactors (Revised September 2002)

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# Protective Clothing and Equipment for Pesticide Applicators

**Pesticides are valuable pest management tools, and like any tool, they must be used carefully and responsibly. Minimizing exposure is an important first step toward reducing your risk of pesticide poisoning. The use of personal protective equipment (PPE) provides benefits to the applicator and is a visual expression of appropriate and legal pesticide use.**

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Use all pesticides safely. Read the pesticide product label and comply with all directions. Failure to do so may not only subject you to state and/or federal penalties, but it also may place you, your family, and the environment at a greater risk of pesticide exposure.

## Manage your Risk

Wearing protective clothing and equipment when handling or applying pesticides reduces the risk of pesticide poisoning by reducing the risk of exposure. This idea is expressed by the Risk Formula:

Risk = Toxicity *x* Exposure

Understanding the toxicity of a product and the potential for personal exposure allows you to lower your risk. No matter how toxic a substance is, if the amount of exposure is kept low, risk can be held at an acceptably low level. The toxicity of a substance can't be changed, but risk can be managed, and the applicator is the manager.

## What is Toxicity?

All pesticides are toxic. They differ only in the degree of toxicity. Because of this characteristic, pesticides are potentially dangerous to people if exposure is high. Pesticide product labels have signal words that clearly indicate the degree of toxicity associated with a given product (*Table I*). The signal words indicate the degree of potential risk to a user, not the expected level of control.

**Table I. Pesticide label signal words and relative toxicities.**

| *Signal Word* | *Toxicity* | *Oral Lethal Dose (for 150 pound person)* |
|---|---|---|
| **Danger*** | Highly toxic | Few drops to 1 teaspoon** |
| **Warning** | Moderately toxic | 1 teaspoon to 1 tablespoon |
| **Caution** | Low toxicity | 1 ounce to more than a pint |
| * May include a skull and crossbones symbol and the word "Poison."<br>** Less for a child or person weighing under 150 pounds. | | |

Pesticides can enter the human body three ways: 1) through the mouth (orally); 2) by absorption through the skin or eyes (dermally); and 3) by breathing into the lungs (inhalation). Along with the signal words, pesticide product labels also include route of entry statements and specific actions a user must take to avoid exposure.

## Read the Pesticide Product Label

Route of entry statements indicate the outcome that can be expected from different kinds of exposure. For example, a pesticide label might read: "Poisonous if swallowed, inhaled, or absorbed through the skin. Rapidly absorbed through the skin and eyes." This tells the user that this pesticide is a potential hazard through all three routes of entry, and that skin and eye contact are particularly hazardous. The specific action statements normally follow the route of entry statements and indicate what must be done to prevent accidental poisoning. With this pesticide example, the statement might read: "Do not get in eyes, on skin, or on clothing. Do not breathe spray mist."

Before handling, mixing, loading or applying any pesticide, read the label directions completely. If the label calls for the use of PPE, comply fully with those directions. The label will define the minimal PPE required for various tasks. Note that the PPE required for mixing and loading may exceed the PPE required during application.

## Use Personal Protective Equipment

The type of PPE needed depends both on the toxicity of the pesticide being used and the formulation (liquid, granular, wettable powder, etc.). Some labels, especially agricultural pesticides, are affected by

the Worker Protection Standards and specifically state that certain items of clothing, equipment, eyewear, footgear and gloves must be used. Others do not include a statement. In general, the more toxic the pesticide, the greater the need for PPE.

## Which PPE is Right?

If a pesticide label does not have specific PPE requirements, always take reasonable precautions. Use the route of entry and specific action statements from the label to determine the type and degree of protection needed to handle the pesticide safely.

Remember that liquid pesticides are often more hazardous to use than dry formulations, and that extra protection is warranted while mixing or loading pesticides. Recognize that in cases where there will be prolonged exposure to the spray or where the application is being made in an enclosed area, you must use extra protection.

## Protective Clothing

Any time you are using pesticides, you should wear at least a long-sleeved shirt and long-legged pants, or coveralls (woven fabric) that fully cover your arms and legs. Select garments made of cotton instead of cotton/polyester blends. Disposable coveralls, such as those made of Tyvek®, provide adequate protection to a pesticide applicator under most conditions. Protective suits made of plastic, rainwear, and fabric coated with PVC, butyl or neoprene may be needed for certain applications.

Shoes and socks also should be worn. Avoid sandals, thongs, and cloth or canvas shoes to minimize exposing feet to liquid pesticides. Leather shoes are suitable while using most pesticides, however, leather will absorb liquids. Therefore, wear chemical-resistant boots while working with highly toxic liquid pesticides (signal word: DANGER), and when there may be prolonged exposure to any pesticide spray. Applicators who must mix and load liquid concentrates, especially those that are highly toxic, also should wear a chemical-resistant apron.

## Protect your Head, Eyes and Hands

Protection for your head is also advisable and in some cases is specifically required. In general, a wide-brimmed, easily cleaned hat that will keep pesticides away from the neck, eyes, mouth and face is adequate. Avoid hats with cloth or leather sweatbands as these will absorb pesticides. Baseball-style caps have headbands that readily absorb and retain pesticides. Labels that specify the use of headgear are generally found on highly toxic liquid concentrates. Wear a waterproof hood or plastic hard hat with a rain-trough edge (to keep drips off your neck and back) and a plastic sweatband when working with these pesticides.

Pesticides are readily absorbed through the eyes and can cause eye injury. Precautionary statements on the labels of pesticide liquids having the signal words WARNING or DANGER generally indicate the use of eye protection. Use goggles or a face shield whenever such a statement is on the label. Adequate protection with goggles is provided if the right type of venting is selected (*Figure 1*). Some goggles are made wider over the bridge of the nose to be compatible with respirators. Safety goggles have three types of venting:

- open vents for impact protection only, not recommended for use with pesticides;
- indirect vents for protection from pesticide and other chemical splash;
- non-vented for protection from gases, mists and fumes.

Gloves also are often needed for mixing, loading and applying pesticides. Unlined, liquid-proof neoprene, butyl, PVC or nitrile gloves with tops that extend well up on the forearm are best. Avoid lined gloves because the lining can absorb the chemicals and is hard to clean. Latex gloves, commonly used by medical personnel, do not provide adequate dermal protection. Avoid cotton gloves because they also can absorb pesticides. In most cases, wear gloves under the sleeves to keep the pesticide from running down the sleeves and into the glove. When working with hands over your head, roll glove tops into a cuff to deter pesticide from running down the gloves to your forearms.

Persons who apply fumigants should be especially attentive to the label statements about personal protective equipment. Some fumigants penetrate rubber, neoprene and leather, and if trapped inside can cause severe skin irritation or be absorbed through the skin.

## Protect your Lungs

The lungs and lining of the respiratory system readily absorb pesticide dusts and vapors from the air. Respiratory protection, therefore, is essential whenever the label calls for it and is recommended during mixing and loading, even if not required by the label. Respiratory protection is also recommended whenever an applicator will be exposed to intensive concentrations of pesticide dusts, fumes or vapors. The type of respirator an applicator uses will be determined by the type and toxicity of the pesticide, application site and other factors.

Dust respirators are acceptable when applying pesticide dusts and granules. They are not recommended for liquid pesticide spraying Always read the pesticide label for product-specific recommendations. Two-strap dust respirators provide much more protection than the one-strap dust mask. They seal better while maintaining their shape and integrity. There are models with exhale valves that make breathing easier, padding over the bridge of the nose for a better seal and comfort, and stronger straps.

A cartridge respirator is suitable when exposure will be intermittent, but if exposure will be continuous, a canister respirator should be worn. If the oxygen supply is likely to be low because of heavy concentrations of highly toxic pesticides, a supplied-air respirator or self-contained breathing apparatus will be needed (*Figure 2*).

**Figure 2. Self contained breathing apparatus (SCBA) with a cylinder air supply (top) and an air line that connects to a safe air source (bottom).**

Respirators used while applying pesticides should be approved by the National Institute of Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA). Be sure to read and follow the manufacturer's instructions for use and care of the respirator. Filters, cartridges, and canisters must be approved for pesticide use (those designated as removing and trapping organic vapors) and must be replaced at proper intervals. Inspect and test respirators before use to insure a snug fit against the face. Users with facial hair may not be able to obtain an adequate seal. Exposed parts of the mask must be cleaned after each use, and the cartridges should be stored in an airtight container.

## Protective Clothing Care

Applicators who routinely work with pesticides should wear clean clothing daily, reserve one set of clothing for pesticide work if possible, and launder and store pesticide-contaminated clothing separately. For more information on laundering pesticide contaminated clothing, see "Laundering Pesticide Contaminated Clothing," NebGuide G943, available from your Extension office or on the web at http://www.ianr.unl.edu/pubs/textiles/g943.htm and *Table II*.

**Table II. Laundering pesticide-solid clothing.**

- Treat all clothing worn while handling or applying pesticides as contaminated!
- Handle ALL contaminated clothing with chemical resistant gloves.
- Wash clothing daily and separately from the family wash.
- Pre-rinse, pre-soak or pre-treat with a stain remover.
- Use HOT water.
- Use the highest water level.
- Use the longest wash cycle.
- Use the heavy-duty liquid detergent.
- Line dry.
- Wash clothing two or three times if heavily soiled or if pesticides are highly toxic, or consider discarding.
- After washing, run the machine through a complete cycle with detergent.

Clothing that has become wet from pesticides should be removed immediately. Fast action will reduce your exposure to the pesticide. Destroy clothing (including shoes and boots) saturated with concentrate or finished spray of highly toxic pesticides. Waterproof and chemical-resistant hats, gloves, boots and goggles also should be washed daily and hung to dry. Test gloves for leaks by filling them with water and gently squeezing.

## Wash Up!

Good personal hygiene is essential. Soap and water is cheap insurance against pesticide contamination. Wash your hands and face often when working with pesticides. Keep soap and water with you wherever you are working. Never smoke, eat, drink or use the toilet after handling pesticides without first washing your hands! Shower immediately after using pesticides and before changing into clean clothes.

## Be Prepared!

Take the pesticide label with you when seeking medical care. Have emergency telephone numbers handy. (Refer to the "Pesticide Safety Telephone Hotlines" card, EC2501, for a list of toll-free numbers.) If you experience any pesticide poisoning symptoms (nausea, skin rashes, headaches, coughing, diarrhea, chest pain, twitching or seizures), see your physician immediately. (See Extension Circular EC2505, "Signs and Symptoms of Pesticide Poisoning.") Hotline cards and Extension Circulars are available from your Extension office or may be available on the Web at http://www.ianr.unl.edu/pubs.

## Purchasing PPE

Protective clothing and equipment is becoming more and more available. For those pesticide applicators who can't locate sources of PPE, a partial list of suppliers is included in *Table III*.

**Table III. Suppliers of personal protective equipment.**

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| **Ag Chem Equipment Co., Inc.**<br>202 Industrial Park Rd.<br>Jackson, MN 56143<br>Phone: 800-760-8800<br>Fax: 800-317-5155<br>Web site: www.sprayparts.com | **Agri-Safety, Inc.**<br>Covington Rd., Hwy. 94<br>Palo, IA 52324<br>Phone: 800-777-2991 / 319-396-2010<br>Fax: 319-396-1757 |
| **Airgas**<br>P.O. Box 1010<br>Germantown, WI 53022-8210<br>Phone: 800-558-8900 / 262-255-7300<br>Fax: 800-237-7307<br>Web site: www.airgas.com | **Compliance Safety, Inc.**<br>P.O. Box 676<br>Northbrook, IL 60062<br>Phone: 800-340-3413 / 847-498-4141<br>Fax: 847-498-6776<br>Email: compliancesafety@worldnet.att.net<br>Web site: www.compliancesafety.com |
| **Continental Safety Equipment**<br>1014 11th St., N.E., Suite D<br>Cedar Rapids, IA 52402-3812<br>Phone: 800-844-7004 / 319-364-7757<br>Fax: 319-364-3238<br>Email: iasales@csesafety.com<br>Web site: www.csesafety.com | **Davis Equipment**<br>5225 N.W. Beaver Dr.<br>Johnston, IA 50131<br>Phone: 800-747-8300 / 515-270-8300<br>Fax: 515-270-0117<br>Email: davis@mail.dwx.com<br>Web site: www.davisequipment.com |
| **Dunrite, Inc.**<br>3405 N Yager Rd.<br>Fremont, NE 68025-7880<br>Phone: 800-782-3061 / 402-721-3061<br>Fax: 402-721-3040<br>Web site: www.dunriteinc.com<br><br>and<br><br>Main Office:<br>7300 Washington Avenue<br>Eden Prairie, MN 55344<br>Phone:(952) 829-2950<br>Fax: (952) 829-2992 / (800) 887-6476<br>Customer service: (952) 829-2999 /(800) 373-5846<br>Email: safety@elvin.com | **Elvin Safety Supply, Inc.**<br>4617 S 139th St.<br>Omaha, NE 68137-4512<br>Phone: 800-373-1654 / 402-861-6584<br>Fax: 402- 861-6586<br>Web site: www.elvin.com |
| | **Fisher Scientific**<br>4500 Turnberry Dr.<br>Hanover Park, IL 60133<br>Phone: 800-772-6733<br>Fax: 800-772-7702<br>Web site: www.fishersafety.com |
| | **G & L Clothing**<br>1801 Ingersoll<br>Des Moines, IA 50309<br>Phone: 800-222-7027 / 515-243-7431<br>Fax: 515-243-4527<br>Email: ganlclothing@dwx.com<br>Web site: www.gandlclothing.com |
| **Gempler's, Inc.**<br>100 Countryside Drive<br>P.O. Box 270<br>Belleville, WI 53508<br>Phone: 800-382-8473<br>Fax: 800-551-1128<br>Web site: www.gemplers.com | **General Fire & Safety**<br>3210 E 14 St.<br>Des Moines, IA 50316<br>Phone: 800-383-3206 / 515-265-3206<br>Fax: 515-265-0840<br>Email: brucemccann@aol.com |

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| | and<br><br>2431 Fairfield St., Ste. A<br>Lincoln, NE 68521<br>Phone: 800-228-4555 / 402-476-4646<br>Fax: 402-476-5238<br>Email: rlipert@cs.com<br>Web site: rjlipert.hypermart.net/<br><br>and<br><br>5641 S 85th Circle<br>Omaha, NE 68127<br>Phone: 800-383-3473 / 402-556-6100<br>Fax: 402-556-8055<br>Web site: www.generalfireandsafety.com |
| **Global Industrial Equipment**<br>22 Harbor Park Dr., Dept. LK<br>Port Washington, NY 11050<br>Phone: 800-433-4848 / 516-625-3456<br>Fax: 800-336-3818<br>Email: service@globalindustrial.com<br>Web site: www.globalindustrial.com | **GT Midwest**<br>4350 Lafayette Ave.<br>Omaha, NE 68131 1026<br>Phone: 402-551-2300<br>Fax: 402-551-4769<br>Web site: www.gtmidwest.com |
| **Hagemeyer Vallen Safety**<br>841 Remington Blvd.<br>Bolingbrook, IL 60440<br>Phone: 800-372-3389<br>Fax: 630-759-0575<br>Web site: www.vallen.com | **Helget Safety Supply, Inc.**<br>4144 S 87th St.<br>Omaha, NE 68127<br>Phone: 402-339-1066<br>Fax: 402-339-1736 |
| **Hunt Cleaners, Inc.**<br>600 W Hwy. 30<br>Cozad, NE 69130-2234<br>Phone: 800-262-4568 / 308-784-3366<br>Fax: 308-784-4169<br>Web site: www.huntcleaners.com | **Lab Safety Supply**<br>401 S Wright Rd.<br>Janesville, WI 53546<br>Phone: 800-356-0783 / 608-754-2345<br>Fax: 800-543-9910<br>Email: custsvc@labsafety.com<br>Web site: www.labsafety.com |
| **Lesco, Inc.**<br>1876 N.W. 92nd Ct.<br>Clive, IA 50325<br>Phone: 800-454-4834 / 515-267-8474<br>Fax: 515-267-8672<br>Email: timgio@pionet.net<br>Web site: www.lesco.com | **Mid-Continent Safety**<br>8910 H St.<br>Omaha, NE 68127<br>Phone: 800-835-7233 or 402-593-7974<br><br>and<br><br>2909 S Spruce<br>Wichita, KS 67216-6689<br>Phone: 800-835-7233<br>Web site: www.midsafe.com |
| **Omark Safety** | **Precision Industries, Inc.** |

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| 3505 104th St.<br>Des Moines, IA 50322<br>Phone: 800-7233 / 515-278-5422<br>Fax: 515-278-5702<br>Email: safety@omarksafety.com<br>Web site: www.omarksafety.com | 4611 S 96th St.<br>P.O. Box 3377<br>Omaha, NE 68127<br>Phone: 800-373-7777 / 402-593-7000<br>Fax: 402-593-7054<br>Web site: www.precisionind.com |
| **Quad City Safety, Inc.**<br>5311 Tremont Ave.<br>Davenport, IA 52807<br>Phone: 800-383-6850 / 563-445-2170<br>Fax: 563-445-2171<br>Email: safety@quadcitysafety.com<br>Web site: www.quadcitysafety.com | **Woodard Company**<br>Animal Health Premix Division<br>1565 280th St.<br>Webster City, IA 50595-0395<br>Phone: 800-247-4896 / 515-832-3594<br>Fax: 515-832-3768<br>Email: woodard@ncn.net<br>Web site: www.woodardco.com |

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