PURDUE PESTICIDE PROGRAMS

Purdue University Cooperative Extension Service

PESTICIDES AND PERSONAL PROTECTIVE EQUIPMENT

Selection, Care, and Use

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ORGANIZATIONAL PHILOSOPHY
GUIDANCE
PESTICIDE LABEL
MSDS
CARE
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ATTITUDES

INTRODUCTION

Decisions on personal protective equipment (PPE) present a challenge for pesticide users on farms and in gardens, pest control businesses, and greenhouses. There is a broad range of pesticides available, with varied toxicities, formulations, and PPE requirements; this, compounded by the equally broad range of PPE available, presents a dilemma for the person responsible for selecting equipment and defining procedures that best suit a particular situation—be it employer or employee. This publication discusses links between safety, attitude, and organizational philosophy; explains why PPE is necessary; offers general guidance on PPE selection; and provides suggestions for care of PPE.

SAFETY LINKED TO TOXICITY AND EXPOSURE

Although pesticide selection hinges on anticipated performance and cost, the risk associated with use is also very important; and because *risk* is relative to *toxicity* and *exposure,* two considerations are essential to proper pesticide selection: How safe (toxic) is the chemical? What will be the exposure level of the applicator?

Many complicated and competing factors affect the answers to these two questions, but choosing a pesticide with low toxicity and taking measures to lessen the potential for exposure are basic elements in minimizing risk—as are knowledge, selection, and maintenance of PPE.

UNDERSTANDING TOXICITY

Pesticide toxicity is something the applicator cannot change: what's in the product, is in the product. Laboratory tests conducted by manufacturers and reviewed by the U.S. Environmental Protection Agency (EPA) determine a product's toxicity and identify its strengths and weaknesses. Pesticide product testing also yields a toxicological profile of the active ingredient(s).

EVALUATING PRODUCT TOXICITY

Answering the following questions may help the user in evaluating the toxicity of a pesticide.

What hazards are associated with the formulation?

Certain risks are more common in some formulations than others. For instance, dusts are easily inhaled; emulsifiable concentrates are readily absorbed through the skin;

and aerosols may irritate the eyes and pose inhalation problems. The formulation of a product dictates the safety precautions required, including use of PPE.

Is the product concentrated?

Pesticides in concentrated form pose a greater risk to the user than do ready-to-use (diluted) products for two reasons: 1) Any product in concentration is more toxic than a dilution of the same product; and 2) an additional step—mixing with water or other carriers—is required before application of a concentrate, thereby increasing the handler's potential for exposure resulting from splashes or spills. The mixing and loading of a concentrated pesticide generally require more PPE than does application of the diluted product.

What is the signal word on a pesticide product?

The relative toxicity of a pesticide is reflected on the label by signal words: DANGER (most toxic); WARNING (moderately toxic); CAUTION (least toxic). Signal words also can reflect the toxicity of the product's nonlethal effects such as skin and eye irritation.

The most vulnerable route of entry determines the signal word. For example, if product XYZ is moderately toxic when absorbed through the skin, highly toxic if inhaled, and only slightly toxic if swallowed, its signal word would be DANGER based on inhalation studies. Two pesticides labeled with the same signal word may or may not require the same PPE because that distinction is based on the most vulnerable route of entry as determined during the testing process. A pesticide with the signal word CAUTION usually will require less PPE than one carrying the signal word WARNING or DANGER. Labels of very toxic pesticides carry the signal word DANGER, accompanied by precautionary statements mandating the use of additional PPE.

Is the product classified for restricted use or general use?

A pesticide product may be classified for restricted use based on its potential effects on human health, wildlife, or the environment. Labels of restricted-use products carry specific precautions to safeguard those entities. Generally, restricted-use pesticides are to be used only by individuals licensed through state pesticide applicator certification exams and licensing requirements, although in some states unlicensed applicators are authorized to use them under the direct supervision of a licensed applicator. A pesticide that is classified for restricted use due to human health concerns requires more PPE than an unclassified (general-use) product.

What are the acute effects of the pesticide?

There is a Material Safety Data Sheet (MSDS) for every pesticide product. The MSDS provides details on the effects of acute (very short-term or one-time) exposure to the pesticide, as well as information on dermal and inhalation toxicity and eye irritation. It contains data on any birth defects, cancer, or reproductive impairments indicated in laboratory studies. The toxicological information summarized in an MSDS forms the basis for label requirements specifying certain protective clothing and equipment. MSDS's are prepared for all product formulations, but few manufacturers write MSDS's for end-use dilutions.

Have chronic effects been documented?

The MSDS provides information on possible adverse health effects linked to chronic exposure (multiple exposures, over time) to the product. Information on cancer, birth defects, and other potential chronic effects, if any, is included in the MSDS. While the short-term effects of a pesticide may be minimal, requiring only basic PPE, its cumulative, long-term effects may necessitate label language specifying more sophisticated equipment.

Applicator Safety Based on Exposure

Employee attitudes about personal safety and PPE for pesticide use often reflect the views of coworkers and supervisors. If pesticide safety and the use of suitable PPE are actively promoted by the upper echelon as means of avoiding overexposure, thereby protecting health and safety, employees may be more willing to comply. Companies that emphasize pesticide safety and consistent use of appropriate PPE are less likely to jeopardize their employees' health and corporate profits—and less likely to face pesticide-related lawsuits and penalties for noncompliance. On-the-job training, hands-on demonstrations, work evaluations, and compliance checks by supervisors can stimulate consistent use of PPE.

Evaluating Risk Potential Based on Applicator Exposure

A company's commitment to pesticide safety is a key factor in whether or not its use of a given product constitutes risk. Applicators who have PPE available and have been trained to use it properly can minimize exposure, thus protecting their health and that of their coworkers regardless of the product's toxicity. The following questions will assist in evaluating the potential for applicator exposure.

How many employees work for the firm?

The more pesticide applicators a firm has, the greater the chance that someone will neglect to follow safety precautions; thus, the greater the chance that an accident will occur.

How experienced are the employees?

Inexperienced employees—young or old, full- or part-time—may not recognize the importance of PPE; therefore they must be educated on its importance and trained to use it properly. Complacency must be addressed. Random inspection should be an ongoing activity to emphasize the importance of PPE and other safety considerations.

Are all employees trained adequately?

Realistically, part-time employees often are not given the safety training available to full-time workers, but this is not acceptable: It is the responsibility of the employer to train *all* employees, their hours on the job notwithstanding.

For what length of time does each applicator use pesticides?

Applicators whose primary duty year-round is applying pesticides obviously are more likely to be involved in a pesticide-related accident than are those who apply pesticides less often. In addition, those who apply pesticides over a long period of time become the subjects of chronic exposure, whereas those who apply chemicals infrequently are less likely to experience cumulative effects.

Answers to the preceding questions should render valuable insights into risks posed to workers who use pesticides. Employers who admit that safety has not been a high priority should consider immediate implementation of a program to protect the health and safety of their employees.

Just as important, high risk pesticides—those that are restricted for health reasons, those that are acutely toxic, and those linked to chronic concerns—should not be used until a safety education program is under way. One option is to select the least toxic pesticide that is effective against the target pest, thereby reducing risk potential.

PERSONAL PROTECTIVE EQUIPMENT: PROTECTING YOUR HANDS

Investing in gloves can pay dividends in safety. Protecting hands and arms with chemical-resistant gloves and a long-sleeved shirt can significantly reduce pesticide exposure during mixing, loading, and application.

Hand Protection and Precautionary Statements on Pesticide Labels

PPE requirements for hand protection are listed on most labels, generally specifying chemical-resistant gloves to guard against pesticide contact. The labels of some pesticide formulations, e.g., wettable powders and granules, merely stipulate the use of waterproof, *not chemical-resistant,* gloves; others, such as those found on many ready-to-use products, may not require *any* gloves. Safety specialists believe, however, that applicators should wear chemical-resistant gloves routinely; it's a simple risk reduction practice that goes a long way in eliminating exposure—and it's a habit that's easy to form.

Examples of Label Statements Pertaining to Gloves

- Applicators and other handlers must wear waterproof gloves.
- Wear chemical-resistant gloves when transferring and mixing (the product) and when adjusting, repairing, or cleaning equipment.
- Applicators and other handlers must wear chemical-resistant gloves made of nitrile or neoprene.

Accidents happen! Be prepared and know what to do if a pesticide is spilled on the skin.

Representative Label Language Addressing Emergency Actions to Take When Skin Contact Occurs

- If on skin: Flush all affected areas with plenty of water for several minutes *(use clean, cool water).* Seek medical attention if irritation occurs.
- If on skin: Flush with plenty of water for at least 15 minutes *(lay the person down on the affected side so that washings do not stream into or onto unaffected areas, e.g., into the other eye or over the rest of the face).* Remove contaminated clothing and shoes *(put in plastic bags, using gloves if possible).* Get medical attention if skin irritation occurs. Wash clothing before reuse *(be sure to wash separately from other clothing).*
- Wash splashes from skin and eyes immediately. If on skin, wash immediately with soap and water. Prolonged contact will cause severe irritation. Contact with irritated skin or a cut, or repeated contact with intact skin, may result in poisoning. Get medical attention immediately. *(The MSDS should be consulted in the case of an emergency requiring treatment by a physician.)*

Selecting Gloves for Hand Protection

Safety manufacturers design gloves to meet the specific needs of applicators handling hazardous chemicals; consideration is given to thickness, cuff length, fabrics and coatings, etc. For example, gloves advertised as chemical-resistant, waterproof, and effective

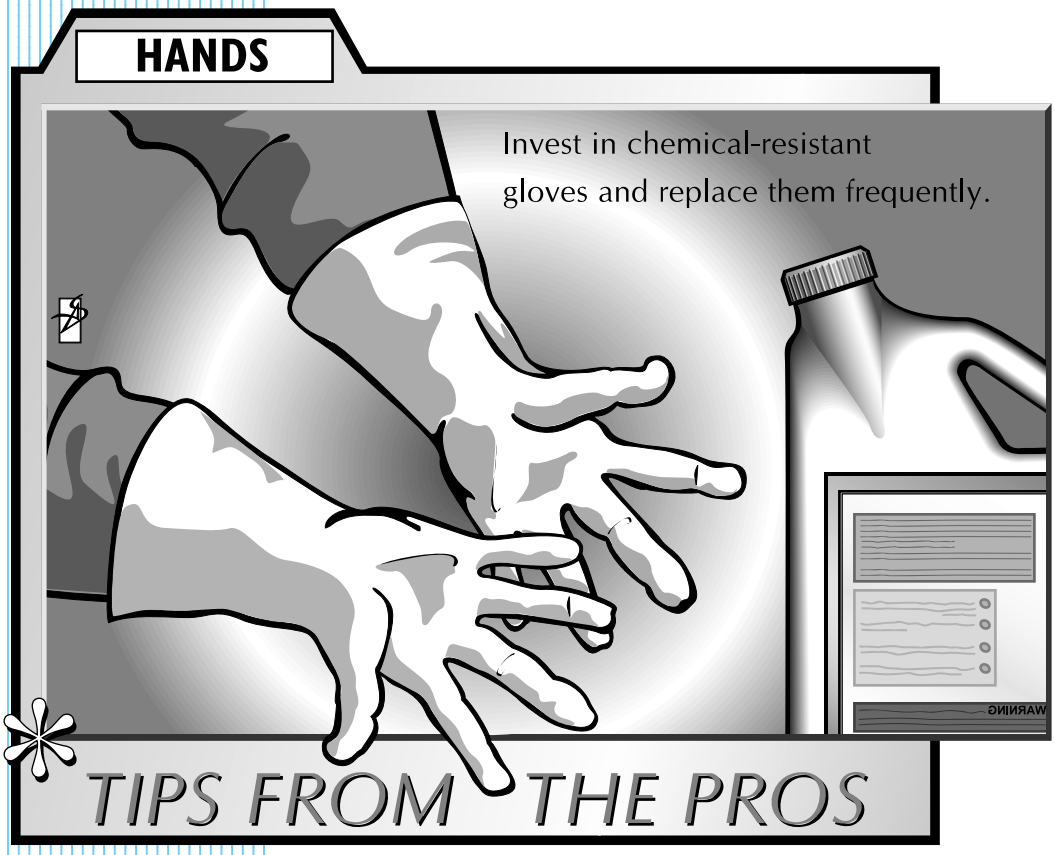
against dry formulations such as wettable powders, water-dispersible granules, microencapsulated granules, and dusts may be easily damaged in contact with solvents in some liquid formulations (e.g., emulsifiable concentrates).

Glove Selection Tips

Taking the time to select the right kind of gloves is important: Make an informed decision.

Glove materials must resist the product's active ingredient and its solvents.

Glove descriptions may indicate the amount of time it takes for a chemical to move from the outside surface of the glove to its interior—generally referred to as *breakthrough time.* Gloves may provide hand protection for a few minutes as in the case of disposable, single-use gloves, or for hours in the case of gloves designed for repeated use. Reusable gloves should have a breakthrough time of at least 240 minutes (4 hours).



Gloves should be thick enough to afford protection during the total time required for completion of the task at hand.

Glove thickness is described in millimeters (1 mil = .001 inch) and the thicker the chemical-resistant glove, the more protection it will provide and the longer it will last under normal use conditions. Thick gloves generally offer more protection against chemical breakthrough but may restrict hand movement; select gloves that are at least 14 mil thick as a trade-off between thickness and manual dexterity.

Gloves should allow adequate grip so that applicators can safely carry out their jobs (e.g., change nozzles and screens).

Various glove surface textures—etched, raised, roughened—influence the wearer's ability to grip.

Gloves should be comfortable: The right fit makes the difference.

The appropriate glove size can be determined by measuring the circumference of the hand (palm and back); for example, a hand circumference of 8 inches indicates a size 8 glove. But some gloves are sold as small, medium, large, etc. A hand circumference of

5–7 inches requires an *extra small* glove;
7–8 inches, *small;*
8–9 inches, *medium;*
9–10 inches, *large;*
10–12 inches, *extra large.*

Gloves must be long enough to adequately protect the hands and arms from chemical splashes.

Glove length is measured from the tip of the middle finger to the farthest edge of the glove. Lengths of 10 to 12 inches provide hand and lower forearm protection; 13 to 14 inches, middle forearm protection; 18 inches, elbow protection; and 32 inches, protection to the shoulder.

Gloves must be unlined.

Cotton, leather, and canvas gloves, as well as gloves lined with these materials, should not be used with pesticides; nor should baby powder or talc be used to make gloves easier to put on and remove. The reasoning is that if the pesticide accidentally leaks inside the gloves, linings and absorbents would actually soak up the chemical and hold it against the skin, thereby increasing the degree of exposure.

Glove Use and Maintenance Tips

- Provide new gloves regularly and as needed or requested by applicators.
- Discard disposable gloves after use.
- Adjust gloves according to the task. When spraying overhead, gloves should be folded with a cuff or extended over long sleeves so the pesticide cannot be funneled into the gloves. Conversely, spraying downward requires long sleeves to extend over the gloves to prevent the pesticide from being channeled into the gloves.
- Keep an extra, clean pair of gloves in a zip-close plastic bag in a location free of pesticides but easily accessible in case the pair you're wearing gets torn or contaminated.
- Wash reusable gloves with soap and water before removing them.
- Store contaminated, reusable gloves in a zip-close plastic bag until final cleanup or disposal.
- Wash chemical-resistant gloves with soap and water and hang by the fingertips to air dry.
- Keep pesticide-contaminated gloves separate from other safety equipment.
- Inspect gloves for visual signs of wear before each use. Watch for clues that new gloves are needed: color changes, thin spots, cracks, softening, swelling, bubbling, and stiffening. Discard all gloves with cuts, holes, abrasions, or staining.
- Never try to patch gloves with duct or electrical tape.
- Triple-rinse gloves before disposal, then cut off the fingers to prevent reuse.
- Do not put pesticide-contaminated gloves in your pockets because chemicals can transfer from gloves to clothing.
- Never leave pesticide-contaminated gloves behind the seat, on the floor board, above the visor, on the stick shift, or in the bed of your truck because pesticide residues may transfer to such surfaces.
- Never wear pesticide-contaminated gloves when feeding or watering livestock, harvesting fruits and vegetables, or cleaning animal pens.

PERSONAL PROTECTIVE EQUIPMENT: PROTECTING YOUR EYES

Eye protection is advisable when handling and applying all pesticides, and some product labels specify its necessity. Pesticides in contact with the eye can cause a wide range of symptoms, from slight irritation to blindness; and while no pesticide-to-eye contact should be considered minor, concentrates generally are more injurious than diluted products.

Eye Protection and Precautionary Statements on Pesticide Labels

A pesticide label may require the use of specific types of eye protection, such as chemical-resistant goggles, or it may only suggest general protective eyewear. EPA defines protective eyewear as safety spectacles with side shields and brow guards; goggles; face shields; or full facepiece respirators.

Following are examples of pesticide label information addressing eye protection.

Caution

A pesticide label with the signal word CAUTION may or may not require protective eyewear. Some manufacturers designate eye protection even for products that have not proven corrosive to the eye in laboratory studies; they believe that eye protection should be worn regardless of the data. In addition, pesticides labeled CAUTION usually require protective eyewear if the pesticide has been linked to long-term effects such as cancer and birth defects. Typical caution statements are as follows:

Avoid contact with skin, eyes, or clothing. Causes moderate eye irritation. Wear eye protection. If pesticide gets into eyes, flush with plenty of water. Get medical attention if irritation persists.

Warning

Avoid contact with skin, eyes, or clothing. Causes temporary eye injury. If in eyes, flush with plenty of water. Get medical attention if irritation persists.

Danger

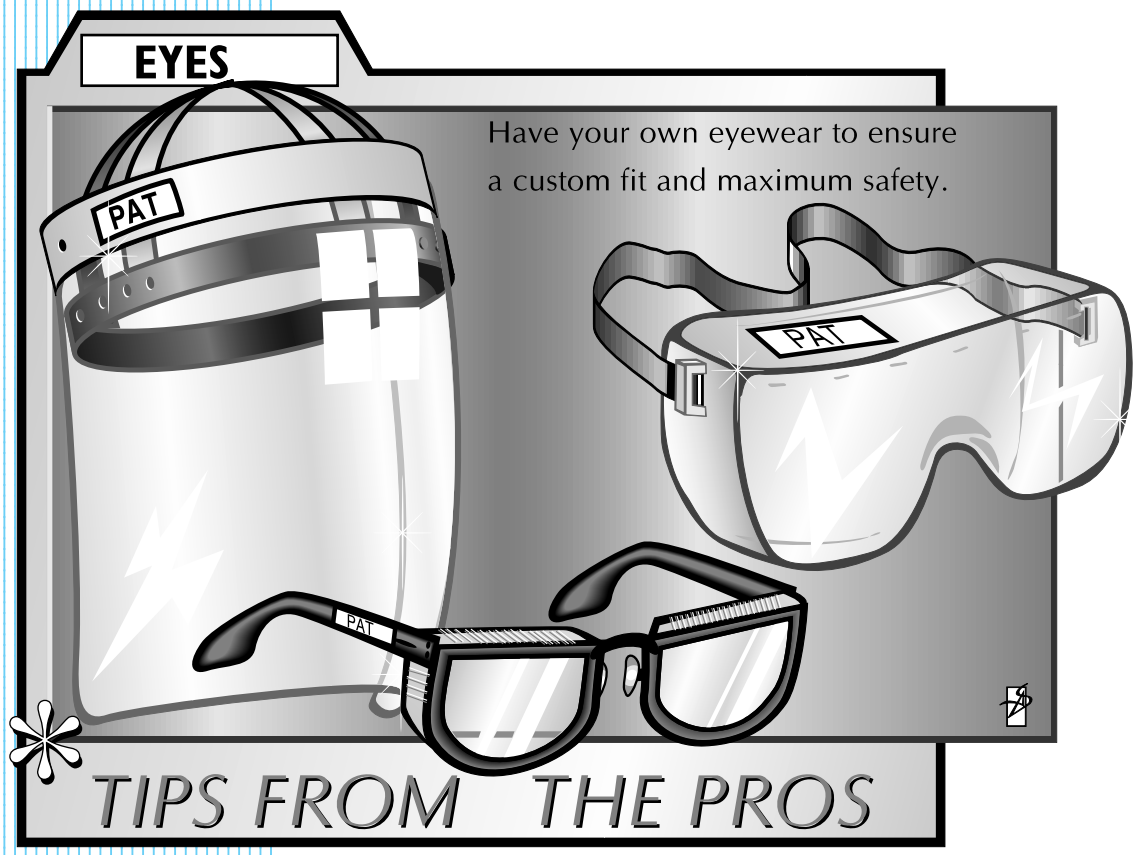
Pesticide users should be especially careful with a pesticide labeled “Corrosive material: causes irreversible eye damage.” These pesticides are labeled with the signal

word DANGER, accompanied by a statement such as the following.

Do not get in eyes, on skin, or on clothing. Corrosive and causes irreversible eye damage. Applicators must wear protective eyewear. If in eyes, hold eyelids open and flush with a steady, gentle stream of water for 15 minutes. Get medical attention.

Selecting Eye Protection Equipment

Selecting safety equipment for preventing eye exposure to pesticides requires an understanding of the potential sources of exposure as well as the kinds of eye protection available. Product formulation determines the probability of exposure: dusts escaping from bagged products; mists from air-blast or fogging sprays; accidental liquid splashes. There are three types of eye protection equipment (excluding the full facepiece respirator) designed to provide eye protection from airborne particles or chemical splashes: safety spectacles (glasses); goggles; and face shields.



Safety Spectacles

Spectacles are the most basic equipment used to protect eyes from particles in the air; they're unlikely to fog and comfortable to wear. Safety spectacles generally are recommended for protection from only the least toxic products, under minimal exposure conditions, and they should have scratch-resistant lenses for maximum visibility and durability. Versions with brow and side shields offer some protection from overhead and side impact, but most safety specialists do not recommend them for protection against chemical splashes because they do not provide full eye coverage. Selecting the correct size is essential to comfort and satisfactory use.

Goggles

Goggles with polycarbonate lenses protect eyes from flying objects, but some fail to provide adequate protection against liquid pesticide splashes. For instance, those manufactured with perforations or air holes for increased air circulation are not considered splash resistant because liquids may leak through the small air holes. Goggles with indirect vents or no vents are considered splash resistant. Most goggles have adjustable straps to fasten them securely to the face, and some have fog-free lenses.

Face Shields

Face shields are intended as secondary means of eye protection and are designed to be worn over safety spectacles or goggles for full face protection. They should not be worn without safety spectacles or goggles.

Selection Tips

- Personal spectacles, goggles, and face shields should be assigned and fitted to each employee. This equipment should not be shared.
- Eye protection equipment should permit peripheral (side) vision.
- When purchasing eye protection, make sure it complies with ANSI Z87 for occupational and educational eye and face protection.
- Most safety spectacles can be purchased with prescription lenses. Contact lenses should not be worn when working with pesticides.

Maintenance Tips

- Always discard damaged gear. Replace spectacles or goggle lenses or face shields when they are pitted, scratched, stained, or cracked.

• Replace head straps when they do not hold goggles or face shields snugly to the face.

• All eye protection equipment should be stored away from possible contamination sites such as chemical storage areas. Place goggles and safety spectacles in clean plastic zip-close bags or carrying cases, then store them in a sturdy box or compartment to prevent scratching, breaking, or crushing.

• Avoid storing eyewear in the sun since heat and ultraviolet radiation can affect the performance of plastic components.

• No eye protection equipment should be left on the seat or floor of a truck, tractor, or other application equipment between uses; likewise, it should not be placed above the visor nor hung from the mirror.

• Clean contaminated protective eyewear immediately after use. Rinse under running water (rather than wiping, to prevent scratches) to remove dust from the lenses; air dry.

• If possible, and on a regular basis, soak equipment in a solution of warm water and soap for 10 to 15 minutes. Goggles should be disassembled: headband, lenses, frame.

PERSONAL PROTECTIVE EQUIPMENT: PROTECTING YOUR LUNGS

Respirators are the most complicated of all personal protective equipment, and mastering their proper selection and use requires time and effort. For example, are you confident that your respirator is the right one for the job? How would you deal with an employee who has a beard? Do you perform a fit check each time you put on a respirator? Can dust masks be used for protection against organic vapors? Have you ever wondered why you could smell or taste the chemical even when wearing a respirator? The knowledge required to answer questions such as these can mean the difference between health and sickness...between life and death.

Respiratory Protection and Precautionary Statements on Pesticide Labels

The statement “Avoid breathing dusts or spray mists” is found on most pesticide labels. Some provide more information, such as outcomes and corrective actions:

• ...may cause respiratory tract irritation. If inhaled, remove to fresh air. Get medical attention if breathing difficulty develops.

Pesticide manufacturers label more toxic products with specific respiratory protection statements when studies

show that use of the product without a respirator may pose a risk.

Respiratory protection is intended to remove contaminants from the air you breath when handling pesticides. Labels are very clear in directing the user to respirators approved by the National Institute of Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA). Following are examples of label directions:

- ...a dust/mist filtering respirator (MSHA/NIOSH approval number prefix TC-21C). [TC = tested and certified]
- ...a respirator, approved for pesticides, having an organic vapor cartridge and pesticide prefilter (MSHA/NIOSH approval number prefix TC-23C), or pesticide canister (MSHA/NIOSH approval number prefix TC-14G).

Identification numbers for all respirators currently approved for pesticides are being replaced by the NIOSH prefix "TC-84A" that signifies approval for particulates (dusts), mists, and organic vapors in combination with particulates. Pesticide manufacturers, over time, will change their labels to specify the TC-84A's, but respirators approved for pesticides under the old regulation may continue being used as long as they still work.

Selecting Respiratory Protection Equipment

Respirators are required when using some pesticide products, but many pesticide labels do not specify their use. Wise applicators, however, will elect to wear one when applying pesticides in enclosed areas such as greenhouses, crawl spaces, and grain bins—even when the label does not require it. Understanding each type of respirator's uses and limitations is the first step in selecting the right respirator for the job. Following are brief descriptions of the different types available.

Air Purifying Respirators

As a worker wearing an air purifying respirator inhales, ambient (outside) air passes through a charcoal cartridge or a filter as it is drawn into the facepiece; the cartridge or filter blocks contaminants, thereby purifying the air before it enters the lungs. Air purifying respirators are available with half or full face masks.

Warning!

Read and follow the respirator manufacturer's instruction manual prior to using the respirator.

Air purifying respirators do not supply fresh air; they merely filter the available air. They cannot be used where the oxygen level is below 19.5 percent, nor in atmospheres

that are immediately dangerous to life or health (e.g., fumigation in an enclosed area).

The wearer, when working in dangerous atmospheres will obtain better protection from a supplied air respirator.

Half Mask Respirators

Most pesticide applicators prefer half mask respirators, and there are two common types. One relies on filters (paper/fiber) to trap dusts, mists, and other particles; and the second type has cartridges. In the latter, air is moved through activated charcoal which chemically extracts much of the gas or vapor contaminant. Combination cartridges with prefilters, which remove dusts and other particulates, also are available.

The filtering facepiece respirator, more commonly referred to as the dust/mist respirator, removes dust, pollen, particles, spray mists, and some nuisance odors as air passes through the fabric of the mask.

The pesticide applicator's comfort, utility, and performance can be improved by using filtering respirators made with some of the following features:

- nonallergenic materials
- a metal nosepiece to facilitate fit
- an exhalation valve that allows moist air to escape the mask
- activated charcoal to remove some odors and vapors
- two straps to ensure a tight fit

Workers who elect to wear a respirator in situations where it is not required by the pesticide label should choose an appropriate NIOSH-approved respirator over a general purpose dust mask. Some filtering respirators do not meet NIOSH standards and therefore should not be used when pesticide labels require NIOSH-approved respirators.

Full Face Respirators

Full face respirators work in the same manner and use the same cartridges and/or prefilters as half mask respirators, and they offer two advantages: They protect the face and eyes against airborne particles and splashes; and they offer a higher level of respiratory protection.

Powered Air Purifying Respirator

Most half mask and full face respirators require the user to physically draw in air. Powered air purifying respirators are equipped with a battery operated blower that forces air into the mask to assist breathing. The forced air cools the atmosphere in the mask and reduces stress on the heart and lungs. Powered air purifying respirators with hoods or helmets may be worn by people with beards.

Supplied Air Respirators

Supplied air respirators are highly specialized for use in atmospheres that are more toxic than those where air purifying respirators are permitted. When equipped with a self-contained emergency air supply, they can be used in atmospheres that are hazardous or where the oxygen level is below 19.5 percent. The air supply is provided through a hose hooked to a stationary cylinder of compressed air or from a portable air pump. Supplied air respirators are more expensive than air purifying respirators and require continual maintenance; and applicators must be specially trained to use them.

Respiratory Protection Equipment Selection Tips

Determine what form of contaminant poses the risk.

There are two forms of chemical contaminants: particulates (dust, mist, and smoke) and vapors (including gases). Therefore, before selecting a respirator for protection against a specific product, consult the product label to determine what physical form poses the risk.

Verify what model of respirator will remove the contaminant in question.

Respirators approved by NIOSH have an attached label bearing an approval number with the prefix “TC.” The product label prescribes a specific respirator by NIOSH approval number. For example, TC-23C respirators are approved for use when contaminates such as organic vapors, acid gas, or ammonia might pose a risk, but all particulate filters now being made are approved with the new designation TC-84A. Although it will be some time before manufacturers begin specifying this new class on pesticide labels, prudent applicators who purchase respirators in the meantime should proceed in selecting a TC-84A model.

Safety equipment catalogs usually list the NIOSH approval number as part of the respirator description. If ordering from a catalog that does not, look for “organic vapor” cartridges and filters. If it is still unclear which to choose, call the toll-free number listed in the catalog and ask to speak to a safety specialist; or call the respirator manufacturer directly. All respirator manufacturers use the same color-coding system in designating cartridges for use in specific applications.

Decide whether or not to purchase a disposable respirator.

Disposable respirators initially cost less, but consider how often the respirator will need to be replaced. Compare

Acid Gas
WHITE

Organic Vapors
BLACK

Ammonia Gas
GREEN

Acid Gas and
Organic Vapors
YELLOW

Highly Toxic
Particulate Filter,
P100(HEPA)
PURPLE

the replacement cost times the estimated number of times replacement would be necessary within a given time period versus the cost of a reusable respirator and its replaceable cartridges and filters over the same time period.

Fit test every wearer, every time.

A qualitative or quantitative fit test must be performed as required by OSHA to determine correct facepiece size (small, medium, or large) There are several fit test protocols and fit testing can be performed by the employer, a trained worker, or a safety professional. OSHA mandates that a fit check be performed *every time* a person puts on a respirator. Instructions on conducting fit checks generally accompany half mask and full face respirators. The procedure takes only a few seconds and must be exercised by the trained worker according to the following steps:

Put on the respirator and tighten all straps. For a *positive* pressure fit check, cover the exhalation valve (the single opening near the chin area of the respirator) with the palm of the hand and *exhale* (blow) into the mask for five to ten seconds. This causes pressure within the mask to increase, causing a slight bulging of the facepiece if fitted properly; if there is a leak, you will feel it.

For a *negative* pressure fit check, block the filter inlets (some models have one inlet; others have two) with the palms of the hand and *inhale* for five to ten seconds, causing a slight collapse of the facepiece.

A good seal is indicated when the facepiece remains slightly bulging (positive pressure) or slightly collapsed (negative pressure) during the fit check. An unsatisfactory seal indicates that air is moving through openings between the respirator and the face, requiring that a second positive and negative pressure fit check be performed. A different size or brand of respirator may be needed.

Remember: There is no such thing as a respirator working “well enough.” A respirator with a leaking facepiece—even a small leak— is not protecting the wearer.

- Make sure half mask respirators allow space for safety eyewear, especially when working with eye or skin irritants.

- Require everyone who wears a respirator to be clean-shaven. Plainly and simply, bearded workers cannot be protected against inhalation exposure by wearing a respirator. Even minimal beard growth prohibits a tight seal.

- Require everyone who wears a respirator to be pre-examined by a physician. Respirators make breathing more difficult, and the resulting stress on the heart and lungs may worsen preexisting conditions and increase blood pressure. No one should wear a respirator without medical clearance. A thorough physical examination and a review of medical history by a qualified physician are a must.

Maintenance Tips

- The manufacturer's instructions that accompany each respirator should be reviewed and retained as a reference.
- Conduct a positive and negative fit check each time the respirator is put on.
- Change cartridges after 8 hours of use or more frequently if the wearer can smell or taste the pesticide or other chemicals; change particulate respirators and prefilters when breathing becomes difficult.
- Throw away cartridges or filters which get wet.
- Look for tears in straps, face shield scratches, missing parts, and general cleanliness of the respirator each time you put it on. Daily inspections are critical.
- Disassemble and sanitize reusable respirators at the end of each work shift. Use a soft brush or cloth and warm water with a germicidal detergent. Rinse the respirator in clean water and air dry.
- Never wash cartridges and filters; they must be discarded.
- Place reusable respirators in a zip-close bag or airtight container for storage; and just to be on the safe side, change the storage bag or container frequently to prevent buildup of any pesticide residue which might have been missed.
- Store respirators properly to prevent distortion (e.g., crushing) of the facepiece.
- Store facepieces, cartridges, prefilters, and replacement parts away from pesticide storage areas.
- Protect respirators in storage from dust, direct sunlight, extreme cold and heat, excessive moisture, and damaging chemicals.
- Purchase replacement parts such as filters and cartridges that are specifically designed for the respirator model used. Never interchange cartridges, filters, or other replacement parts from different respirator manufacturers. Users should never try to repair respirators. Consult the manufacturer or distributor from whom the respirator was purchased and make arrangements for a professional to handle repairs.

Written Respirator Program for OSHA 1910.134

The document which appears on pages 20–21 of this publication is intended to simulate an actual written respirator program. Use it as a guide for writing your own.

Purpose

The purpose of this document is to outline the procedures which employees are required to follow when using a respirator.

Objective

The primary objective is to prevent exposure to airborne contaminants through good management practices. The use of appropriate respiratory protection equipment will be enforced as required by pesticide labels or specific workplace conditions.

Responsibility

1. _____ (Name) is responsible for implementing and supervising the respiratory program.

2. Employees, in accordance with the instructions and training received, are responsible for using the respiratory protection provided. Employees shall immediately report to their supervisor any malfunction of respiratory equipment.

Program Elements

1. Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employee.

2. The supervisor shall designate a respirator for each job on the basis of specific hazards. Only NIOSH/MSHA-approved respirators shall be used.

3. The user shall be instructed and trained in the proper use, limitations, and maintenance of respirators. Every employee who wears a respirator shall receive fitting instructions and witness demonstrations on fitting, adjusting, and verifying the seal; each user also shall be required to practice these elements.

4. A qualitative respirator fit test shall be performed to determine the ability of each individual respirator wearer to obtain a satisfactory fit when using a negative pressure respirator.

5. Employees shall use respirators according to the training instructions.

6. Respirators shall be cleaned and disinfected regularly.

7. Respirators used routinely shall be inspected during cleaning. Worn or deteriorated parts shall be replaced. Respirators for emergency use (such as supplied air respirators) shall be thoroughly inspected after each use and monthly when not in use.

8. Respirators shall be stored in a convenient, sanitary location.

9. Written procedures shall be prepared for safe use of respirators in dangerous atmospheres that might be encountered in normal operations or in emergencies.

10. Refresher training shall be completed on an annual basis.

Medical Evaluations

1. No person shall be furnished a respirator nor assigned to tasks requiring the use of a respirator unless it has been determined that they are physically able to perform the work and use the equipment. A physician shall determine what health and physical conditions are pertinent.

2. Respirator users' medical status shall be reviewed periodically. Physical examinations shall be repeated on a regular basis for all employees who are required to use respirators. The frequency of examination shall be determined by the attending physician.

Program Maintenance and Effectiveness

Regular evaluation of the program—and adjustments to policy, as necessary—shall ensure its continued effectiveness. Routine, in-house inspections shall be conducted to ensure compliance.

1. Appropriate surveillance of the work area shall be ongoing and records of employee exposure maintained.

2. There shall be continual inspection and evaluation to ensure the effectiveness of the program.

3. Observations of and discussions with new employees shall be conducted to confirm that they have been given proper and sufficient training.

4. All employees shall be consulted periodically concerning their work habits relative to respirator use.

5. The overall effectiveness of the respirator program will be evaluated on an annual basis by the program administrator; action will be taken to correct defects, as necessary.

Program Availability

Copies of this respiratory program are available in the main office and as a separate section to the company's OSHA Hazard Communication Standard plan.

_____ (Name)	_____ (Company Position)
_____ (Signature)	_____ (Date)

PERSONAL PROTECTIVE EQUIPMENT: PROTECTING YOUR BODY

Wearing the clothing and personal protective equipment specified on a pesticide label is important to prevent or minimize exposure. PPE protects the body against splashes that may occur while pouring concentrates from a container, as well as spray mists that may drift onto to the applicator under certain conditions.

Even under minimum exposure conditions, the selection of clothing should be given careful thought. A long-sleeved shirt, long pants, shoes, and socks are essential. Layers of clothing help reduce exposure by impeding the penetration of the pesticide.

Additional protective clothing sometimes is required to supplement the protection offered by ordinary work clothes. For example, a product label may require that cotton coveralls be worn over work pants. Chemical-resistant boots and an apron may be required clothing for mixing some pesticides. Proper clothing, when used with other safety measures, will reduce the likelihood that an applicator will be accidentally exposed.

Forearm and Leg Protection

Protecting the skin on the arms and legs is an important way to reduce pesticide exposure. Arms may become contaminated during mixing and loading operations if gloves are too short. Lower pant legs may become contaminated during lawn care applications.

Sleeve guards are designed for protection of the arms when wearing a long-sleeved shirt. Guards cover the arm from the wrist to above the elbow and have elastic in both ends to hold them close and block pesticide from the openings. Chaps are designed to cover the legs; they fasten to the belt at the waist and are held to the ankle with elastic. Chaps provide additional protection during turf and nursery applications where the lower leg is most vulnerable to exposure. Long, protective pants are also available.

Sleeve guards, chaps, and protective pants are available in several materials. Some are disposable; others are reusable. If reusable, they should be cleaned thoroughly after each use.

Footwear

Some labels may only direct applicators to wear *shoes plus socks.* Others may specify *chemical-resistant footwear, plus socks.* There are many types of chemical-resistant footwear designed to be worn over socks; others are to be

worn over ordinary shoes. Rubber and neoprene are commonly used in making chemical-resistant footwear. Leather and canvas are not recommended for footwear because they can absorb pesticides and trap them next to the skin; and they are not considered chemical-resistant.

The structure and design of footwear also are important. For example, steel toes protect the feet, and anti-skid soles and tread help prevent falls. Tall boots provide leg protection; and disposable booties can be worn over shoes for short-term, minimal protection from exposure, primarily in dry conditions.

Pant legs should hang over the outside of footwear so that pesticides cannot be funneled down the pant leg into the shoes or boots. Footwear should be washed in soapy water after each day's use. As with all PPE, footwear worn during a pesticide application should not be worn indoors; and if it becomes damaged or is leaking, it must be discarded.

Headgear

Spraying upward into trees, using an air blaster in an orchard, or using a hand-held sprayer in greenhouses may expose the head, shoulders, and back to pesticides. Labels direct applicators spraying overhead in any situation to wear chemical-resistant headgear.

Well designed headgear provides protection for the scalp, neck, and ears and can help prevent pesticides from reaching the body through neckline openings in clothing. Headgear can take many forms and may be either stiff and impact resistant or soft enough to tie around the face like a hood; it may be a hat with a broad brim or a full hood that drapes to cover the shoulders. Some hoods are attached to coveralls or jackets, and some can be purchased separately. Disposable hoods are available in a number of waterproof and chemical-resistant materials.

Aprons

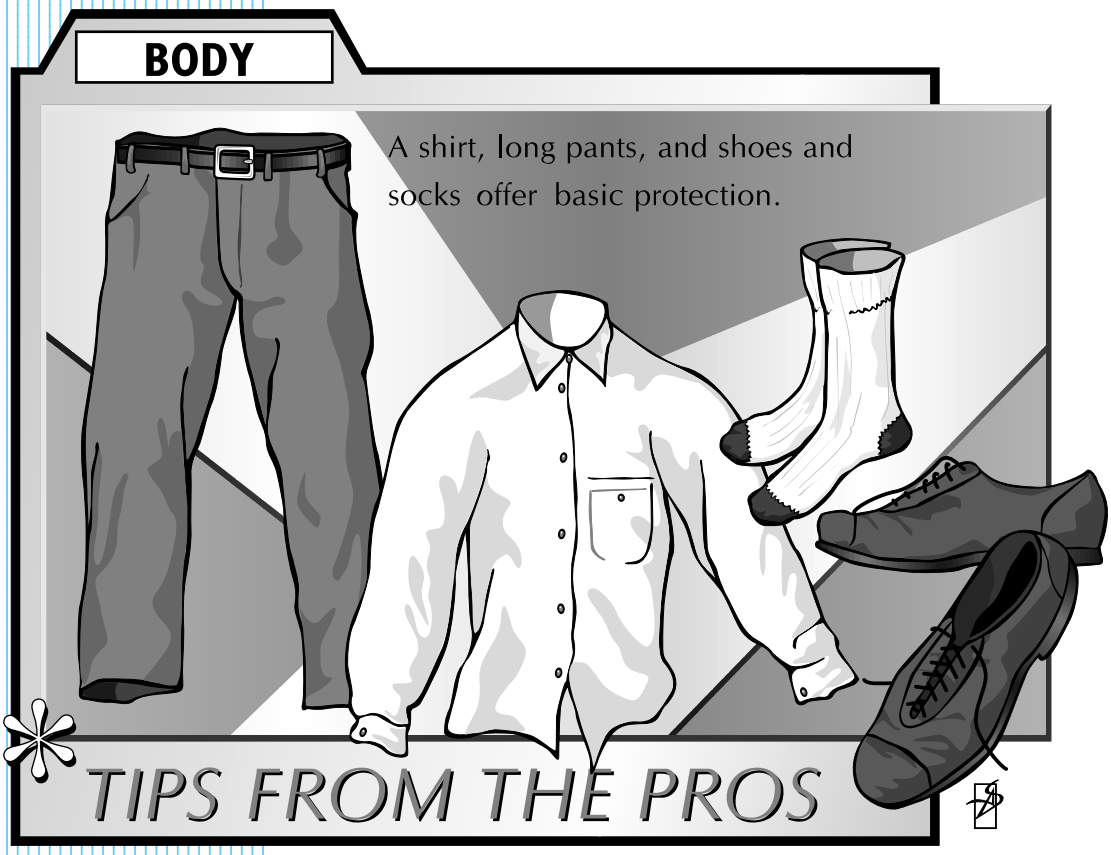
Pesticide users can decrease the likelihood of frontal exposure by wearing chemical-resistant aprons. The product label may state that a chemical-resistant apron is to be worn when mixing, loading, or cleaning equipment. Pesticides bearing the signal word DANGER and products with chronic toxicity potential may require an apron in addition to other protective clothing to protect against spills. Chemical-resistant aprons are available in materials such as butyl, neoprene, and nitrile. Aprons backed with cotton or other materials are resistant to tearing; but backing materials can absorb pesticides, making cleanup difficult or impossible.

Although aprons offer protection against pesticide exposure, many workers do not wear them. In some cases, aprons can lead to accidents when the user must climb ladders or work around machinery. Seek the advice of workers who will be expected to wear aprons, and use their input in selecting the best apron for the job, or perhaps an alternative such as coveralls.

Coveralls

Labels may specify the use of coveralls to provide an extra layer of protection against pesticides penetrating to the skin. They are available in reusable, limited-use, and disposable styles.

Washable, reusable cotton or cotton blend coveralls are acceptable when using low toxicity pesticides (those labeled CAUTION). However, because trace amounts of pesticides cannot be removed from cotton fabrics, annual or more frequent replacement is suggested. Cotton coveralls should never be used when handling liquid pesticide concentrate; anytime a concentrate comes into contact with clothing that is not chemical-resistant, the garments must be properly discarded.



Reusable coveralls or two-piece rain or splash suits designed to wear over regular work clothes can be purchased with coatings of PVC, rubber, neoprene, nitrile, or polyurethane over a durable cotton, nylon-scrim, or polyester backing. They differ in chemical resistance and may be washable. Manufacturers' labels can guide the selection process and should explain care recommendations, although insufficient research has been conducted on the effectiveness of specific care methods in removing pesticide contamination.

Limited-use or disposable coveralls generally are designed to be worn for one workday, then discarded in the trash. There are many limited-use coveralls available. Some limited-use coveralls are coated to withstand repeated wear; but, nevertheless, they should be discarded after eight hours' total wear (all in one day or cumulatively over multiple days). Limited-use, nonwoven coveralls must be discarded once they are contaminated or damaged. Some types disintegrate upon washing; others may not. Never wash disposable, nonwoven coveralls since laundering tends to reduce their repellency and could move contaminates to the inside of the garment.

Limited-use protective coverall fabrics differ in breathability, weight, thickness, flexibility, strength, durability, abrasion resistance, and chemical resistance. Consult pesticide product labels and safety supply catalogs in selecting the right coveralls for a given set of circumstances; or contact safety specialists referenced in safety equipment catalogs. University PPE experts and Cooperative Extension Service specialists also can lend advice, upon request.

Tyvek coveralls are probably the most familiar disposable brand because they are widely available and inexpensive. Three types are available for different situations:

- Regular Tyvek breathes and offers about the same protection from granules and dusts as regular cotton coveralls. It performs better than cotton when light spray or mists are involved, but it does not protect against concentrated materials.

- Tyvek QC is polyethylene-coated to repel water and offers better chemical resistance than regular Tyvek or cotton.

- Tyvek/Saranex-23P provides chemical resistance for pesticides with higher toxicities and is resistant to corrosive ones. It offers good protection against a broad range of pesticides. However, this fabric lacks breathability. It requires that the wearer be consistently alert for signs of heat stress.

Often, the same brand name is used for materials of differing chemical resistance, ranging from what is needed for dry particulate or minor splash situations to that required

for more severe exposures. Regular Tyvek, Comfort-Gard, Kappler CPF-I, and Kleenguard offer breathable fabrics that resist water and small particles, but they are not recommended for chemical protection. Trade names such as Tychem, Kappler CFP (II, III and IV), and Responder describe suits designed for chemical protection, hazardous chemical splash, and hazardous material cleanup.

Coveralls for pesticide application should be selected to provide appropriate chemical resistance against the pesticide and its formulation. Applicators should also be aware of other safety considerations.

Coveralls should fit well. A snug fit at the neck will prevent pesticides from filtering down the back and chest. Coveralls also should have adequate torso length to allow ease of movement. However, they should not be so loose or baggy that they are susceptible to entanglement in moving parts of machinery. Coverall materials are very strong and do not tear easily if caught in machinery. Entanglement of clothing can lead to traumatic injury, unrelated to pesticides. Coveralls may have attached hoods or separate head protection.

If disposable coveralls are too long in the sleeves or pant legs, they can be cut off because the fabrics do not ravel. If woven fabric coveralls are shortened, they will need hemming to prevent raveling of strong yarns that can be an entanglement hazard.

PESTICIDE LABELS PROVIDE VALUABLE SAFETY INSTRUCTIONS

EPA's pesticide registration process takes into consideration a product's label information on the use of personal protective equipment. Pesticide applicators must rely on label information to know what PPE to use when handling a given product. Wearing inappropriate PPE, or failure to wear any at all, can lead to overexposure. Physical illness from overexposure can mean absence from work, sometimes triggering loss of income. It can mean mounting medical expenses, and stress. Physical illness from overexposure can result in pain and suffering—sometimes even death.

If PPE label instructions are ignored and routine overexposure does occur, lawsuits and penalties may follow. If failure to comply with label directions is proven, regulatory action against the applicator and/or the affiliated company may result.

Protective clothing and equipment statements are located on the label (or labeling) of a pesticide product under *Hazards to Humans and Domestic Animals* or as "Agricultural Use Requirements" under *Directions for Use.* The Worker Protection Standard (WPS) requires that labels of pesticides used on farms or in forests, nurseries, or greenhouses list the types of PPE the user must employ. It is important to realize that PPE required by a pesticide label represents *minimum* protection; the applicator may elect to use more protective clothing or equipment than is stipulated on the label.

EPA requires that all pesticide labels bear the following statement under the heading *Directions for Use:* "It is a violation of federal law to use this pesticide in a manner inconsistent with its labeling." Legally, the statement places the responsibility for using the product according to label directions directly on the buyer and user. The intent is to communicate to users—homeowners, farmers, commercial applicators—that they are personally responsible for judicious use of the pesticide.

EPA Chemical Resistance Category Chart

Labels refer to chemical resistance categories (A through H) for personal protective equipment. Items in these categories are made of materials that the pesticide cannot pass through during the times indicated below the chart. The categories are based on the solvents used in the pesticides, not the pesticides themselves. Therefore, there will be instances where the same pesticide in two different formulations (e.g., wettable powder and emulsifiable concentrate) will require PPE from two different chemical resistance categories.

The following is an example of label information referring a user to the EPA Chemical Resistance Category Chart:

> *"The chemical resistance selection category for this product is H. For more information about PPE materials that are resistant to this product for various lengths of time, consult an EPA chemical resistance category chart."*

The EPA chemical resistance category chart on page 28 shows that pesticide products in the H category require barrier laminate or Viton materials for a full day's exposure, whereas butyl, nitrile, and rubber offer protection for 10 minutes of contact with the chemical. No other materials offer chemical resistance to, nor protect against, category H chemicals.

EPA Chemical Resistance Category Chart

Category Listed on Pesticide Label	Type of Personal Protective Material							
	Barrier Laminate	Rubber*				Polyethylene	Polyvinyl Chloride*	Viton*
		Neoprene	Butyl	Nitrile	Natural			
A	high	high	high	high	high	high	high	high
B	high	slight	high	slight	none	slight	slight	slight
C	high	high	high	high	moderate	moderate	high	high
D	high	moderate	high	moderate	none	none	none	slight
E	high	high	slight	high	slight	none	moderate	high
F	high	moderate	high	high	slight	none	slight	high
G	high	slight	slight	slight	none	none	none	high
H	high	slight	slight	slight	none	none	none	high

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 or two of contact.

Slight: Slightly chemical resistant. Clean or replace PPE within ten minutes of contact.

None: No chemical resistance. Do not wear this type of material as PPE when contact is possible.

*Recommendation based on PPE at least 14 mil or greater in thickness

Listed below (in blue) are examples of wording found on pesticide labels relative to personal protective equipment required when handling the product; below each example are EPA interpretations of those label statements. When confused as to what a pesticide label means, consult these guidelines. In most cases, the first line of a label statement addressing personal protective equipment indicates what is required for *minimum* protection; use of additional or more sophisticated equipment, for added protection, is left to the discretion of the user.

- Long-sleeved shirt and long pants
  - Long-sleeved shirt and long pants, or
  - Woven or nonwoven coverall, or
  - Plastic- or other barrier-coated coverall, or
  - Rubber or plastic suit
- Coverall over short-sleeved shirt and short pants
  - Coverall over short-sleeved shirt and short pants, or
  - Coverall over long-sleeved shirt and long pants, or
  - Coverall over another coverall, or
  - Plastic- or other barrier-coated coverall, or
  - Rubber or plastic suit
- Coverall over long-sleeved shirt and long pants
  - Coverall over long-sleeved shirt and long pants, or
  - Coverall over another coverall, or
  - Plastic- or other barrier-coated coverall, or
  - Rubber or plastic suit
- Chemical-resistant apron over coverall or over long-sleeved shirt and long pants
  - Chemical-resistant apron over coverall, or long-sleeved shirt and long pants, or
  - Plastic- or other barrier-coated coverall, or
  - Rubber or plastic suit
- Chemical-resistant protective suit
  - Plastic- or other barrier-coated coverall, or
  - Rubber or plastic suit
- Waterproof suit or liquid-proof suit
  - Plastic- or other barrier-coated coverall, or
  - Rubber or plastic suit
- Protective eyewear
  - Shielded safety spectacles, or
  - Face shield, or
  - Goggles, or
  - Full face respirator

- Goggles
  - Goggles, or
  - Full face respirator
- Waterproof gloves
  - Any rubber or plastic gloves sturdy enough to remain intact throughout the task being performed
- Chemical-resistant gloves
  - Barrier-laminate gloves, or
  - Other gloves that glove selection charts or guidance documents indicate are chemical-resistant to the pesticide for the period of time required to perform the task
- Chemical-resistant gloves such as butyl or nitrile
  - Butyl gloves, or
  - Nitrile gloves, or
  - Other gloves that glove selection charts or guidance documents indicate are chemical-resistant to the pesticide for the period of time required to perform the task
- Shoes
  - Leather, canvas, or fabric shoes, or
  - Chemical-resistant shoes, or
  - Chemical-resistant boots, or
  - Chemical-resistant shoe coverings (booties)
- Chemical-resistant footwear
  - Chemical-resistant shoes, or
  - Chemical-resistant boots, or
  - Chemical-resistant shoe coverings (booties)
- Chemical-resistant boots
  - Chemical-resistant boots
- Chemical-resistant hood or wide-brimmed hat
  - Rubber- or plastic-coated safari-style hat, or
  - Rubber- or plastic-coated firefighter-style hat, or
  - Plastic- or other barrier-coated hood, or
  - Rubber or plastic hood, or
  - Full hood or helmet that is part of some respirators

WASHING REGULAR WORK CLOTHING

All clothing worn while handling pesticides should be considered contaminated, whether or not it is obvious. Work clothing worn while mixing, loading, or applying pesticides (even that worn during granular applications) must be stored and washed separately from the rest of the laundry; and it is the responsibility of the user, be it employer or applicator, to ensure that it is. Further, it is the responsibility of the supervisor to inform the person in charge of the laundry,

whether it is done by a commercial laundry service or in the home, that work clothes are contaminated.

Labels seldom explain how to launder pesticide-contaminated clothing. At best, a label might instruct the user as follows—and all of it is good advice: *Discard clothing that has been drenched or heavily contaminated with product concentrate. Do not reuse it. Follow manufacturer's instructions for cleaning PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separate from other laundry*.

Success in washing pesticide residues from common work fabrics hinges on the pesticide and its formulation, the fabric thickness and fiber content, the laundering method, and the length of time between contamination and laundering. The longer the wait, the less is removed. Follow these safety tips when washing work clothes worn while using pesticides.

Step-By-Step Methods for Laundering Pesticide-Contaminated Clothing

- Empty pockets and cuffs of clothing worn for granular applications, outdoors, to remove trapped granules before the clothing is stored to be washed. But don't sit on the back step to do this! Pesticide debris of this nature must be emptied onto an appropriate (application) site; that is, if a pesticide is not labeled for use on turf, it is likewise inappropriate—and illegal—to empty small quantities of the product from pockets and cuffs onto the lawn. Also, stay clear of children's play yards, pet and livestock facilities, and any other sensitive areas.
- Discard clothing that has been drenched by a concentrate, because the pesticide probably could not be removed to a safe level. Some studies indicate that heavily contaminated clothing still has detectable residues after ten washings, so be on the safe side: Discard drenched clothing.
- Wash contaminated clothing the day contamination occurs.
- Store contaminated clothing in a trash bag or hang it away from the family living space, in a work shed or on a clothes line outdoors.
- Never put contaminated work clothes in cloth bags or laundry baskets with other family laundry.
- Remember that socks and undergarments also may be contaminated and should be stored and washed separately from the family laundry.
- Open the washer door before handling pesticide-contaminated clothing to avoid contaminating the outside of the washer.

• Wear rubber or chemical-resistant gloves to handle contaminated clothing. Pesticides can transfer from fabric to the skin and from one fabric surface to another. Do not use these gloves for other purposes; residues on gloves can transfer to water, fabrics, and other surfaces.

• Prerinse or presoak contaminated clothing in a separate tub or use the rinse cycle of the washer. When using a washer, drain the water and refill for washing.

• Pretreat contaminated clothing with a solvent-based prewash spray, especially if the contaminant is an emulsifiable concentrate.

• Wash pesticide-contaminated clothing separately from the family laundry. Research has shown that pesticide residues can be transferred from contaminated clothing to uncontaminated fabric in the wash water.

• Wash contaminated clothing and other PPE daily, as soon as possible after wearing. Delay in laundering will reduce the likelihood of total residue removal. Pesticides may bond to oily soil (if present) in clothing, making them more difficult to remove, therefore increasing the likelihood of pesticide residues remaining in laundered clothing.

• Use a heavy-duty liquid laundry detergent for best performance, especially in hard water and when the contaminant is an emulsifiable concentrate.

- Wash only a few items at a time to allow plenty of room for agitation and ample water for dilution of residues. Use the highest water level setting, even with small loads.

- Use only *hot water,* not warm. Set the water heater at 140˚F if there are no children or elderly family members who might be in jeopardy of scalding.

- Use at least a 10-minute wash cycle.

- Use a cold water rinse to conserve energy; no benefit from a warm rinse has been demonstrated.

- Check clothes for signs of stains or odors after laundering and rewash, if necessary, before drying.

- Line dry outdoors, if possible, because some pesticides are broken down by sunlight.

- After washing contaminated clothing, run the washer through a complete cycle with hot water and detergent, without clothes, before washing family laundry. This helps flush pesticide residues from the machine.

Other Tips for Cleaning Pesticide-Contaminated Clothing

- Starching cotton or cotton blend fabrics before drying may facilitate pesticide residue removal following subsequent wearings. Pesticides deposited on the fabric may bond to the starch and be washed away with it during laundering. Starch must be reapplied after each washing in order to maintain effectiveness. If the pesticide user is uncomfortable in starched clothing, consider starching specific areas of the garment. For instance, heavy starching of lower pant legs of coveralls and jeans should not create an uncomfortable fit but would enhance residue removal from that area.

- Soil- and water-repellent products applied to cotton fabrics may improve resistance to pesticide contamination, but they may make contamination that does occur more difficult to remove. If these products are used, reapply them after every second or third wash.

- Ammonia, chlorine bleach, and fabric softeners are not effective in reducing pesticide residues.

- Do not wash contaminated chemical-resistant gloves with clothing. Gloves tend to be more heavily contaminated than other garments, and washing them with the rest of the laundry could result in movement of additional pesticide residue to other items.

- Pesticide residue levels in clothing can be reduced with multiple washings; but consider the toxicity of the pesticide product, the product's water solubility, your time, and associated costs (such as water bills) compared to garment replacement costs.

CONCLUSION

Personal protective equipment is your responsibility. Whether your business is farming, custom application, nursery management, greenhouse cultivation, pest control, or home gardening— and whether you have no employees or 100—if you use pesticides, you need to learn all you can about PPE. Every day, new types of PPE become available. Choosing among the many alternatives is serious business because PPE is effective only when it is carefully selected, properly fitted, routinely used, and fastidiously maintained. It may not provide protection if any of these points is missed.

This publication outlines responsibilities pertinent to selecting, using, and maintaining PPE, but it is only a starting point; there is more to learn. Experience will generate a better understanding, and safety supply catalogs and other reading materials will enhance the user's knowledge of PPE. Communicate regularly with resource people and educators who specialize in industrial hygiene, safety, textiles, and pesticide applicator training.

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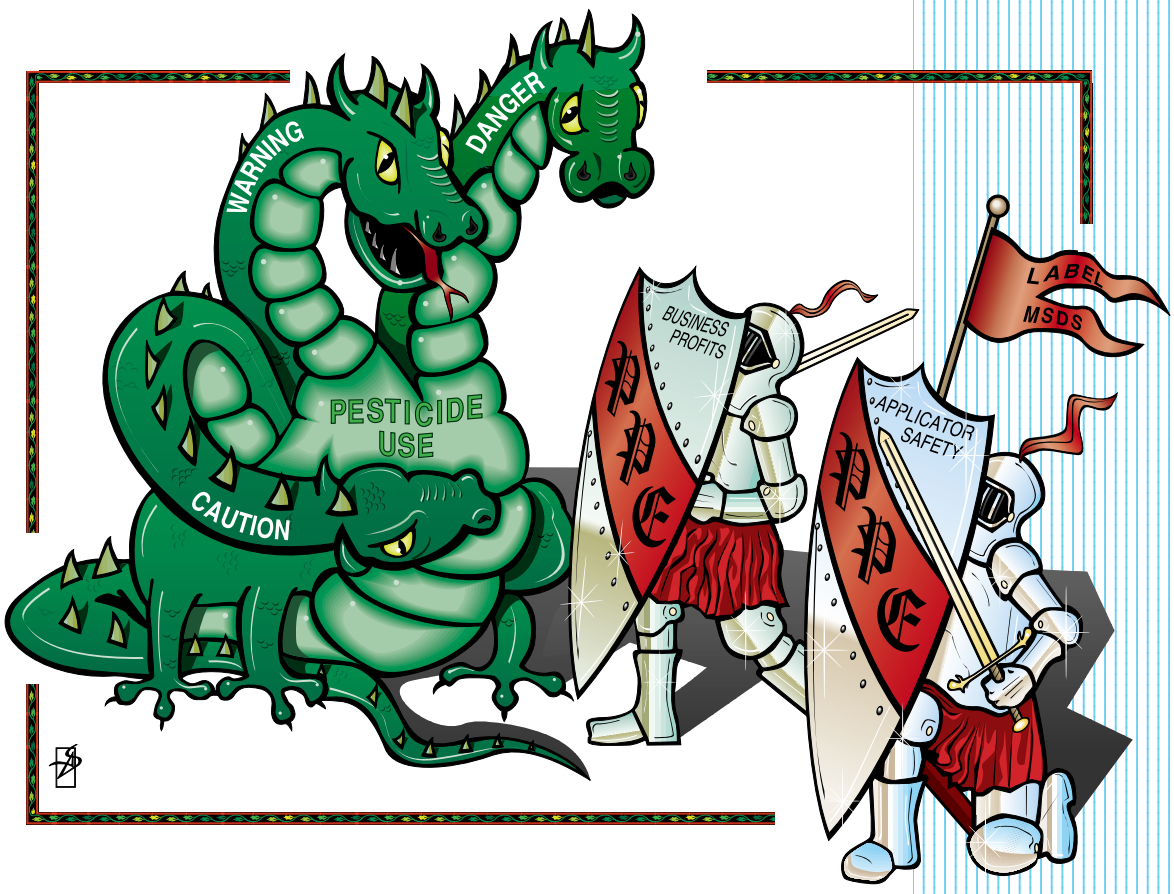
WARNING
DANGER
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PPE
LABEL
MSDS
APPLICATOR SAFETY
PPE

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