



This is a section from the

**2020/2021**

**Mid-Atlantic**

**Commercial Vegetable**

**Production Recommendations**

The recommendations are **NOT** for home gardener use.

The **full manual**, containing recommendations specific to New Jersey, can be found on the Rutgers NJAES website in the Publications section: <http://njaes.rutgers.edu/pubs/publication.asp?pid=E001>.

This manual will be revised biennially. In January 2021, a **critical update** with important updates to the 2020/2021 manual will be communicated through local Extension Agents and Vegetable Specialists.

The **label** is a legally-binding contract between the user and the manufacturer. The user must follow all rates and restrictions as per label directions. The use of any pesticide inconsistent with the label directions is a violation of Federal law.

**Cooperating Agencies:** Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

## D. Pesticide Safety

### 1. General Information

Pesticides are hazardous substances that can cause serious harm if used improperly. Federal and state pesticide laws and regulations control product sale and distribution, storage, transportation, use, and disposal of pesticides. For food and feed crops, EPA establishes legal amounts of pesticide residue allowed on a crop at harvest (or in processed foods). State pesticide laws and regulations may be more restrictive, and would take legal precedence over federal.

#### 1.1. Pesticide Registration

All pesticides sold or distributed in the United States are required to be registered by the United States Environmental Protection Agency (EPA) under the requirements of the Federal Insecticide Fungicide Rodenticide Act As Amended (FIFRA), unless they qualify for an exemption. State product registration is also required, and can be more restrictive. For example, some states require state registration of “minimum risk pesticides” which are exempt from federal registration. But, in no case can a State allow registration of a pesticide, or a use of it, without prior registration or exemption by federal EPA.

Pesticides have an inherent toxicity, or capacity to cause harm to living organisms. Under FIFRA, EPA may only register those pesticide uses that do not pose unreasonable risk of harm to human health and the environment. EPA’s determination of whether and how a pesticide is registered for sale is based on evaluation of scientific data and assessment of risks and benefits of a product’s use.

The process of registering a pesticide is a scientific, legal, and administrative procedure through which EPA examines: the ingredients of the pesticide; the particular site or crop where it is to be used; the amount, frequency, and timing of its use; and storage and disposal practices.

EPA requires extensive scientific data on the potential health and environmental effects of a pesticide before granting a registration. The process EPA uses for evaluating the potential for health and ecological effects of a pesticide is called risk assessment. This includes evaluating the potential for harm to humans, wildlife, fish, and plants, including non-target organisms and endangered species. It also includes evaluating contamination of surface water or ground water from runoff, leaching, or spray drift.

As a condition of registration, EPA must review and approve the label. EPA then assigns an EPA Registration Number which is a unique product number for regular registrations, distributor registrations, Special Local Needs registrations, and Experimental Use Permits.

In order to mitigate the risk of harm to human health and the environment, EPA will impose a set of conditions, directions, and precautions that define who may use a pesticide, as well as where, how, how much, and how often it may be used. These mandatory requirements for registration are incorporated into pesticide product label statements. Pesticide product labels are legal documents. In other words, the label is the law.

This statement is found on all registered pesticide product labels in the United States:

**“It is a violation of Federal law to use this product in a manner inconsistent with its labeling.”**

EPA Registration Review is required a minimum of every 15 years. EPA is legally authorized to initiate this process or other actions earlier, at any time in the product life cycle. EPA has the authority to suspend or cancel the registration of a pesticide if subsequent information shows that continued use would pose unreasonable risks. Pesticides (or particular pesticides uses) that no longer meet the safety standard of not posing unreasonable risk of harm to human health and the environment may be cancelled, or reregistered only with strict limitations and changes in labeled uses.

#### 1.2. Pesticides and Food Safety

For food and feed crops, EPA is required to establish maximum pesticide residue limits allowed on a crop at harvest called “tolerances” by commodity. Tolerances, or exemptions from the requirement of a tolerance, are published in the Code of Federal Regulations at 40 CFR 180.

The Food Quality Protection Act (FQPA) of 1996 required that all existing tolerances be re-evaluated by EPA so that pesticides used on food and feed would meet a legal safety standard of “a reasonable certainty of no harm” when used according to the pesticide label. Once registered, a Registration Review of a pesticide’s registration and

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tolerances are conducted by EPA a minimum of every 15 years to ensure that a pesticide's FQPA safety standard is still being met.

Tolerances are legally enforceable by the United States Department of Agriculture and Food and Drug Administration. **Meeting established food safety standards requires strict adherence to the pesticide label. It is illegal and unsafe when a grower: exceeds the rate of application on the label; uses a product on a crop that is not on the label; or harvests a crop before the pre-harvest interval on the label.** If the residue exceeds the set tolerance, the crop may not be marketed or sold. It is subject to condemnation and seizure by federal or state regulatory agencies.

## 2. Certification of Pesticide Applicators

EPA considers certain pesticides to have the potential to cause unreasonable adverse effects to the environment and injury to applicators or bystanders unless users are specially trained in handling and application. As a condition of registration, EPA may restrict use of a pesticide, (or certain of its' uses) solely to certified applicators, or someone under that applicator's direct supervision. A "**restricted use pesticide**" (RUP) is a pesticide that EPA requires may only be applied by or under the direct supervision of **trained and certified** users.

In 1972 under FIFRA, EPA required states to set up a program to train and certify applicators of RUP to use them safely without endangering human health or the environment. Pesticide applicators become certified by demonstrating that they are competent to apply or supervise the use of RUPs, generally by examination. Many states approve recertification courses that certified applicators can take to maintain their certification. The examinations and training courses pertain to a category or type of pesticide application (e.g., agricultural plant pest control, seed treatment, structural pest control, etc.).

Certified users of pesticides are further classified as either private applicators or commercial applicators. Certification requirements and processes are somewhat different for each group, and may differ by State when state requirements are more stringent than federal. For example, some states require certification of applicators to use ANY EPA-registered pesticide, not just restricted use pesticides. **Please contact your state's applicator certification agency or your state Extension Pesticide Safety Education Program for state-specific regulations. You may contact either for further assistance. For contact information, see chapter G.**

The definitions of private and commercial applicators are as follows:

**Private Applicator.** Any person who uses, or supervises the use of, pesticides for the purpose of raising some type of agricultural commodity. The application can be done on land owned or rented by the applicator or the applicator's employer. However, any applications done on a "for-hire" basis for the purpose of raising an agricultural commodity are considered commercial applications. Examples of private applicators are dairy farmers, vegetable or fruit growers, greenhouse growers, and ranchers that apply pesticides only within their own confines.

**Commercial Applicator.** Any person who uses, or supervises the use of, pesticides on a "for-hire" basis; any person who applies pesticides for non-agricultural purposes; or any person who applies pesticides as a part of their job. This includes employees using pesticides in the course of their job working with any governmental agency such as a County mosquito control commission.

Examples of commercial applicators in agriculture are those individuals who work for a commercial pesticide handling establishment that provide handler services to growers or nurseries during the growing season. When hiring application services, verify that the handlers have certification as a *commercial* applicator, as well as the *corresponding category of use* required by your State for the application being made (for example, Agricultural Pest Control, Plant Agriculture Pest Control, or Aerial Application). Individuals providing soil fumigation services for hire must be licensed as commercial applicators by the State where they **perform** fumigation.

### IMPORTANT

**In New Jersey, private and commercial applicators, including organic growers, must be certified, and possess a valid applicator license, to make applications or supervise the use of ANY EPA-registered pesticide.**

Licensed commercial applicators must always be physically present when an unlicensed individual is making a commercial pesticide application. New Jersey licensed commercial pesticide "operators", acting under the direct supervision of a licensed commercial applicator, may legally make application without that applicator being physically present. However, the supervising licensed applicator must be immediately available by phone, beeper, text, etc., and be able to be present within three hours ground transportation.

### 3. The Pesticide Label

Your best guide to the correct and safe use of any pesticide is the product label. Pesticide labels contain such important and pertinent information as the brand or trade name, the amount of active ingredient, directions for use, environmental hazards, what to do in the case of an accident, and storage and disposal directions.

Each product is required to have its EPA registration number and EPA establishment number as part of the container label. These numbers are valuable to pesticide applicators as unique identifiers in case of: accidental poisoning; claims of misuse; faulty product (poor control or phytotoxicity, for example); or liability claims.



#### 3.1. Labels and Labeling

A pesticide applicator is legally bound by the labeling found on and with the pesticide container in their possession. Labels are the written, printed, or graphic matter on, or attached to, the pesticide or device or any of its containers or wrappers. “Labeling” means the label and any technical bulletins, circulars, leaflets, or other printed or graphic material to which the label refers to, or which accompanies the product when distributed or sold. Advertising material not accompanying the product is not considered labeling.

Literature such as Safety Data Sheets legally become a part of the pesticide labeling, **but only when accompanying a pesticide (i.e., during distribution and sale)**. The SDS (formerly called a MSDS) is written or printed material concerning a hazardous chemical that is prepared by the manufacturer or the company importing the product describing the physical and chemical properties of the product according to specific guidelines.

**Webpages cited in/on the label** are legally considered labeling. This includes when a label has a Quick Response Code (QR Code) barcode that leads to consumer information. Another example is when a label requires the completion of EPA-approved training and provides its web link. A condition of legal use by the applicator of the pesticide product would be completion of the online training (*see example in section D 3.3.1 Soil Fumigants*).

“**Web-distributed labeling**” is a legally-valid, enforceable labeling for a pesticide product that is accessible online. The product label provides a link that directs users to the website with the web-distributed labeling. The complete online label must be printed and in the possession of the applicator when using the product. Web-distributed labeling is **currently voluntary for pesticide manufacturers to adopt**, and not supported by the vast majority of pesticide manufacturers.

With the exception of “web-distributed labels” or specific links found directly on the product label, **pesticide labels downloaded from the web are NOT legal documents**. Sources of online labels include: State regulatory agencies; EPA; and labeling services such as Kelly Solutions, CDMS, National Pesticide Information Retrieval System (NPIRS), Agrian, and others. Almost all provide disclaimers that they are only “specimens” of a label. Online labels may be helpful, but they should not be substituted for that distributed with and on the container itself. Product formulations and directions periodically change. Although a product container may appear the same, never assume that a replacement container has exactly the same contents and labeling as what you last purchased.

Labeling can include **Supplemental Labels** that are distributed with the product. These partial labels are EPA-approved new, not previously registered uses of the product. These new uses will typically be included in subsequent product labels. Supplemental labels must bear the product’s EPA registration number, and direct users to the product label for complete directions and precautions. Another example of a Supplemental Label is a “Section 24C Local Needs” label (Section 24C) where a State issues a Supplemental Label with an additional use of a federally registered pesticide product, or a new end use product to meet special local needs. Compliance with both the product label and supplemental labeling is required to safely and effectively use these products. **Important: Both the product label AND supplemental labeling must be in the possession of the user when using the product.**

#### 3.2. Label Statements

FIFRA requires that each product label bear both hazard and precautionary statements for humans and domestic animals. Hazard statements describe the type of hazard that may occur, while precautionary statements will either direct or inform the user of actions to take to avoid the hazard or mitigate its effects. EPA’s decision to register a product is based, in part, on the assumption that mandatory use directions, restrictions, and precautions of the pesticide label will be followed by the applicator. This section contains information on selected statements that will be found on a pesticide label.

### **3.2.1 Restricted Use Classification Statement**

The “Restricted Use Pesticide” classification, and the reason for RUP classification must appear at the very top of the label's front panel directly under the phrase “Directions for Use”. EPA may assign a restricted use classification when it has determined that the pesticide product, or its use, has a high acute toxicity; has a history of accidents; may cause oncogenic effects (tumors), teratogenic effects (birth defects), fetotoxic effects (harm to a developing fetus), or reproductive effects (such as a lowered sperm count); can leach into ground water; or can harm wildlife.

As a condition of product registration, a pesticide (or certain uses of it), that are classified as restricted use, must bear the statement: “For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator’s certification”.

The RUP statement must also include the reason for restricting use. The RUP statement for a particular pesticide product containing the active ingredient atrazine is depicted below. The label signal word for this product is “Caution”, and would not warrant RUP classification by acute toxicity. However, in this instance, EPA restricted use to certified applicators and those under their direct supervision due to ground and surface water concerns.

On a case-by-case basis, some product-specific RUP statements may be more restrictive based on risk management decisions by EPA. Paraquat is a recent example; see section D 3.3.2 for details on its more restrictive RUP statement: “Restricted Use Pesticide Due to Acute Toxicity For Retail Sale To and Use By Certified Applicators Only – Not to Be Used by Uncertified Persons Working Under the Supervision of a Certified Applicator”.

Also, some states may impose further restrictions on a RUP, such as limiting sale to certified applicators only. For example, only certified applicators, possessing a valid New Jersey applicator license, may purchase restricted use pesticides. At no time can either licensed pesticide operators or unlicensed handlers purchase RUPs in NJ.

**Please contact your state’s applicator certification agency or your state Extension Pesticide Safety Education Program for state-specific regulations. You may contact either for further assistance. For contact information, see chapter G.**



### **3.2.2 Signal Words**


An important feature of pesticide labels is that they are required by law to carry certain “signal words” on the front panel of the label that indicate their **relative acute toxicity to humans**. The signal word on EPA pesticide products can be **DANGER**, **WARNING**, or **CAUTION**. Signal words help alert users to the **acute (short-term)** toxicity of the formulated pesticide product.

The signal words are typically determined by the results of the six acute toxicity studies performed with the product formulation: acute oral, acute dermal, acute inhalation, primary eye irritation, primary skin irritation, and sensitization. The acute toxicity studies measure systemic toxicity by route of exposure; while the primary eye and skin studies measure irritation or corrosion; and the dermal sensitization study evaluates the potential for allergic contact dermatitis.

EPA signal words designated on a product label are based on the LD<sub>50</sub> acute toxicity data of the pesticide product as formulated. Data is collected from small mammal population studies where a common measure of acute toxicity is the lethal dose (LD<sub>50</sub>) or lethal concentration (LC<sub>50</sub>) that causes death (resulting from a single or limited exposure) in 50 percent of the treated animals.

EPA categorizes acute toxicity of pesticides into four toxicity categories (I - IV) using LD<sub>50</sub> data according to regulations at 40 CFR §156.62 and its draft revision in 1984. Chemicals are considered highly toxic when the LD<sub>50</sub>/LC<sub>50</sub> is small (Toxicity Category I) and practically non-toxic (Toxicity Category IV) when the value is large.


**Table D-1. EPA Signal Words According to Toxicity Categories (I, II, III, IV) of Pesticide Products<sup>1</sup>**

Study	Category I		Category II	Category III	Category IV
	 <b>Danger Poison</b>	<b>Danger</b>	<b>Warning</b>	<b>Caution</b>	<b>None or Caution</b>
Acute Oral	LD <sub>50</sub> ≤ 50 mg/kg	—	LD <sub>50</sub> > 50 - 500 mg/kg	LD <sub>50</sub> > 500 - 5,000 mg/kg	LD <sub>50</sub> > 5,000 mg/kg
Acute Dermal	LD <sub>50</sub> ≤ 200 mg/kg	—	LD <sub>50</sub> > 200 - 2,000 mg/kg	LD <sub>50</sub> > 2,000 - 5,000 mg/kg	LD <sub>50</sub> > 5,000 mg/kg
Acute Inhalation	LC <sub>50</sub> < 0.05 mg/liter	—	LC <sub>50</sub> > 0.05 - 0.5 mg/liter	LC <sub>50</sub> > 0.5 thru 2 mg/liter	LC <sub>50</sub> > 2 mg/liter
Primary Eye Irritation	—	Corrosive; irreversible destruction of ocular tissue; corneal involvement or irritation persisting more than 21 days	Corneal involvement or irritation clearing in 8-21 days.	Corneal involvement or irritation clearing in 7 days or less	Minimal effects clearing in less than 24 hours
Primary Skin Irritation	—	Corrosive (tissue destruction into the dermis and/or scarring)	Severe irritation at 72 hours (severe erythema or edema)	Moderate irritation at 72 hours (moderate erythema)	Mild or slight irritation (no irritation or slight erythema)
Dermal Sensitization	Positive			Negative	
	Product is a sensitizer or is positive for sensitization			Product is not a sensitizer or is negative for sensitization	

<sup>1</sup> Adapted from EPA Label Review Manual Chapter 7, rev March 2018.

### Assignment of Signal Words

The signal word is determined by the most severe toxicity category assigned to the five acute toxicity studies (see Table D-1). Dermal sensitization is simply positive or negative and is not assigned a Toxicity Category. For example, if a pesticide product was assessed a Toxicity Category III for inhalation but a Toxicity Category II for oral, the Signal Word placed on the label would be WARNING corresponding to the more highly toxic Category II. A signal word is required for all registered pesticide products, unless the pesticide product is classified as Toxicity Category IV for all routes of exposure, and is negative for dermal sensitization.

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**EPA Toxicity Category I: DANGER POISON.** Highly toxic, causing acute systemic illness if eaten, absorbed through the skin, or inhaled. The approximate lethal dose to kill the average person by ingestion is a taste to a teaspoon. The product labels of any products with “Danger-Poison” must have: 1) the skull and crossbones; 2) the word "POISON" prominently printed in red on a background of distinctly contrasting color; and 3) A statement of an antidote or a practical treatment in case of poisoning by the pesticide.
- EPA Toxicity Category I: DANGER.** Highly toxic. through corrosivity causing irreversible damage to the skin or eyes. Poison should not be used for products Category I Toxicity when the determining effect is not systemic illness (by oral, respiratory, or skin absorption routes of exposure).
- EPA Toxicity Category II: WARNING.** Moderately toxic if eaten, absorbed through the skin, inhaled; or it causes moderate eye or skin irritation. The approximate lethal dose to kill an average person through ingestion is a teaspoon to an ounce.
- EPA Toxicity Category III: CAUTION.** Slightly toxic if eaten, absorbed through the skin, inhaled; or it causes

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slight eye or skin irritation. Ingestion of an ounce to more than a pint is the approximate amount needed to kill the average person.

- **EPA Toxicity Category IV: None Required (or CAUTION as optional).** Lowest EPA toxicity category (IV) by all routes of exposure (oral, dermal, inhalation); and does produce the other effects of eye or skin irritation. They do not require a signal word. However, a manufacturer may voluntarily use the signal word “Caution” for Toxicity Category IV.

Signal Words alert the applicator to the relative acute toxicity for short term exposure, during the application itself. It is important for applicators to understand that LD<sub>50</sub>/LC<sub>50</sub> data has limited use for comparing pesticides (other than acute toxicity). They do not reflect what dose may lead to other less serious, acute systemic effects, or to other, possibly equally serious contact effects or delayed systemic effects.

- LD<sub>50</sub>/LC<sub>50</sub> data does not reflect any effects from long-term exposure (*i.e.*, cancer, birth defects or reproductive toxicity) that may occur at levels below those that cause death.
- Also, they do not translate directly to humans because our body systems are slightly different from those of test animals (*e.g.*, rats, mice, etc.).
- Lastly, the LD<sub>50</sub> and LC<sub>50</sub> are measures of a single exposure, not the potential buildup of effects resulting from multiple exposures.

Most importantly, the results of the six acute toxicity studies determine the appropriate precautionary statements for the hazards to humans and domestic animals, personal protective equipment, and first aid statements. Hazards to Humans and Domestic Animals statements are required for products classified as toxicity categories I, II, or III, or positive for skin sensitization. Hazards to Humans and Domestic Animals statements may specify both mandatory actions and advisory information.

### **IMPORTANT:**

**The danger in handling pesticides does not depend *exclusively* on toxicity values. A compound may be highly toxic but present little hazard to the applicator if the precautions are followed carefully. Hazard is a function of both toxicity and the amount and type of exposure...**

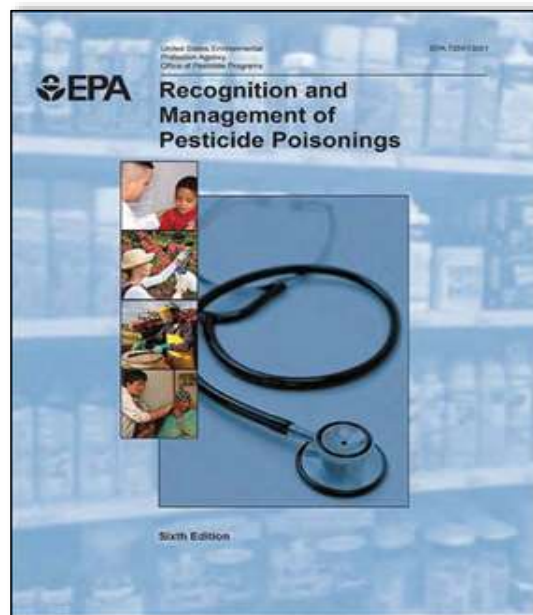
### **3.2.3 First Aid Statements**

First aid statements generally provide initial first steps to take when accidental exposure occurs, and may inform physicians and emergency responders of appropriate medical procedures for victims of poisoning.

Pesticide labels are required to have First Aid statements if the product has systemic effects in EPA Toxicity Category I, II, or III, or skin or eye irritation effects in Category I or II. Some labels will have First Aid statements for use dilutions specified by the label.

Get medical advice immediately if you or any of your fellow workers have unusual or unexplained symptoms that develop within 24 hours of a pesticide exposure. Be alert for the early symptoms of pesticide poisoning and contact effects in yourself and others. Recognizing symptoms early and providing an immediate first-aid response may save a life or prevent permanent injury. Do not wait until you or someone else gets dangerously ill before calling a physician or going to a hospital. It is better to be too cautious than to act too late.

Take the pesticide label with you, either a duplicate copy or the one attached to the container (or at a minimum, the EPA registration number of the product). To avoid contamination and exposure, do not carry pesticides in the passenger space of the vehicle. The *Recognition and Management of Pesticide Poisonings: 6<sup>th</sup> Edition* manual gives healthcare providers a quick reference resource for the best toxicology and treatment information for patients with pesticide exposures.



Downloadable in its entirety or by chapter at <https://www.epa.gov/pesticide-worker-safety/recognition-and-management-pesticide-poisonings>. The fifth edition is available in Spanish. Free copies of the manual (EPA publication # 735K13001) are available from the National Service Center for Environmental Publications at <https://www.epa.gov/nscep>.

**If you are having a medical emergency after using pesticides, call 911 immediately. If you have any of the following symptoms during or shortly after using pesticides: headache, blurred vision, pinpoint pupils, weakness, nausea, cramps, diarrhea, and discomfort in the chest, call a physician and the National Poison Control Center hotline (1-800-222-1222). Your call will be routed to your State Poison Control Center.** Anyone with a pesticide exposure poisoning emergency can call the toll-free telephone number for help. Personnel at the Center will give you first-aid information and direct you to local treatment centers if necessary. **For immediate medical attention call 911. Prompt action and treatment may save a life.**



#### **In Case of an Accident**

- **Remove the person from exposure.**
- **Get away from the treated or contaminated area immediately.**
- **Remove contaminated clothing.**
- **Wash with soap and clean water.**
- **Call a physician and the Poison Control Center (1-800-222-1222) or agency in your state.**
- **Have the pesticide label with you!**
- **Be prepared to give the EPA registration number to the responding center/agency.**

#### **3.2.4 Other Label Statements**

If risks of concern are identified in the risk assessment, EPA evaluates potential risk management measures. Precautionary statements that reduce risk will be included on the label, such as:

- reductions in application rates and changes to directions for use;
- extending the restricted-entry interval;
- requiring engineering controls, such as use of closed systems for mixing and loading to reduce potential exposure to those who mix and load pesticides;
- safe handling procedures to avoid spills;
- not spraying the pesticide when a crop blooms to protect pollinators; or
- create buffers of unsprayed zones along water bodies to reduce exposure to surface water, etc.

In some cases, the use of a pesticide may only be acceptable if one or more risk mitigation measures are implemented. In other cases, pesticides will not be reregistered for certain use sites or for all uses because of unacceptable worker risk. When EPA determines that labeling cannot sufficiently mitigate the risk of pesticide harm, it may include special risk mitigation measures. See sections D 3.3.1 Soil Fumigants and D 3.3.2 Paraquat Dichloride (Paraquat) for recent label changes to allow continued registration.



## 3.3 Significant Labeling Changes

### 3.3.1 Soil Fumigants

EPA required specific safety measures to increase protections for handlers, re-entry workers, and bystanders from risk of exposure for use of the soil fumigants **chloropicrin, dazomet, metam sodium/potassium, dazomet, 1,3-dichloropropene, iodomethane, dimethyl disulfide, and methyl bromide**. As gases, fumigants move from the soil to the air at the application site and may move off site at concentrations that produce adverse health effects in people from hours to days after application. These health effects range from mild and reversible eye irritation to more severe and irreversible effects, depending on the fumigant and the level of exposure.

Revised safety measures were incorporated in the product labels. **Each of these fumigants have been reclassified as restricted use pesticides due to acute toxicity, and can only be used by a certified applicator or persons under their direct supervision.** Additionally, the labels of these pesticides were amended to require that only trained handlers can assist with application and apply these soil fumigants.

In 2012, each manufacturer was required to develop and implement **training programs for applicators in charge of soil fumigation** so these applicators are better prepared to effectively manage fumigant operations. Training must be completed every 3 years. Currently **EPA-approved soil fumigant training** for certified applicators may be found at: <https://www.epa.gov/soil-fumigants/soil-fumigant-training-certified-applicators>.

Soil fumigant labels require users to prepare a site-specific **fumigation management plan** (FMP) before the application begins. EPA has developed fumigant management plan templates that fulfill the elements required by the labels; see <https://www.epa.gov/soil-fumigants/fumigant-management-plan-templates-phase-2-files-listed-chemical>. Alternately, users may develop their own fumigant management plan or use one developed through an outside vendor to meet the label requirements rather than using these templates.

Some states currently require pesticide applicator certification categories for soil fumigation. These states may develop separate manuals, or they may use a national manual/certification study guide, the “Soil Fumigation Manual” produced by the National Association of State Departments of Agriculture Research Foundation; downloadable from [http://s3.amazonaws.com/nasda2/media/Pages/Fumigation\\_lo.pdf?mtime=20171025135626](http://s3.amazonaws.com/nasda2/media/Pages/Fumigation_lo.pdf?mtime=20171025135626). Additionally, some states will be requiring applicators to notify their state’s licensing agency prior to use of these fumigants. If you use commercial fumigators, be sure to verify their category license for your State.

Currently, New Jersey does not have a separate license requirement for use of soil fumigants. Private applicators do not have to have an additional license to apply soil fumigants in New Jersey. And commercial soil fumigation may be performed by those commercial applicators possessing a category license in Agricultural Plants. However, private or Agricultural Plant category applicators are still required to read and follow all elements of the soil fumigant label, just like any other pesticide. In New Jersey there is no requirement for notification of soil fumigant use to the NJDEP. Rutgers has a limited stock of the national Soil Fumigation Manual (cited above) available to NJ applicators to use as a reference.

Based on revision of federal applicator certification regulations, some method of **separate method-specific soil fumigation certification** will be required by all state pesticide regulatory agencies, if not already in place.

These changes will require revision of state regulations in most cases.

**Earliest anticipated implementation is 2022.**

### 3.3.2 Paraquat Dichloride (Paraquat)

Paraquat dichloride (also referred to as paraquat) is highly toxic to humans. One small accidental sip can be fatal, and there is no antidote. Dermal or eye contact can also have serious lasting effects. A combination of public concern and EPA’s evaluation of incident data prompted an in-depth statistical analysis of paraquat incidents ahead of the typical mitigation phase of Registration Review.

EPA’s “Paraquat Dichloride Human Health Mitigation Decision” required changes in allowed uses of paraquat to mitigate risk to human health incidents involving paraquat. Risk mitigation measures that must be implemented to address accidental ingestion and worker exposure incidents were based on the high number and severity of human health incidents associated with the pesticide.

Sample revised RUP statement on paraquat product label with “acute toxicity” reason for RUP status.



In order for pesticide products containing paraquat to meet the FIFRA standard for registration, EPA determined the following risk mitigation measures were necessary for continued registration:

1. Use of paraquat is restricted to certified pesticide applicators only (*see RUP statement graphic above*).
2. Noncertified persons working under the supervision of a certified applicator are prohibited from using paraquat (including mixing, loading, applying the pesticide, and other pesticide-related activities);
3. Applicators are required to take an EPA-approved paraquat training program every 3 years in order to mix, load, apply, or handle paraquat;
4. Changes to the pesticide label and warning materials (*see cap seal to right*) to highlight the toxicity and risks associated with paraquat; and
5. New closed-system packaging designed to make it impossible to transfer or remove the pesticide except directly into the proper application equipment.



*Paraquat Cap Sticker*

All persons handling paraquat are expected to take the training every 3 years and retain documentation of successful completion. EPA-approved paraquat training is hosted at the Extension Campus at <https://campus.extension.org/enrol/index.php?id=1660>. The training is approximately 45 minutes. After completion, a training certificate is generated for applicators to keep in their records for three years.

## 4. Handling Pesticides

### 4.1 Prior to Pesticide Application

**Use pesticides for only those crops specified on the label, and use only those that have both state and federal registration. Using a pesticide for any other uses or in any other manner than specified on the label is against the law.**

**Verify**, prior to application, that a commodity-specific tolerance or tolerance exemption exists for a particular pesticide prior to use on food or feed crops. For a list of pesticides that have tolerances or exemption from the requirements of a tolerance, see <https://www.epa.gov/pesticide-tolerances/how-search-tolerances-pesticide-ingredients-code-federal-regulations>). Contact your State Extension for assistance when in doubt; see chapter G for contact information.

In advance of the application itself, applicators should **read and review the label carefully**, and make preparations to be able to follow all directions and precautions specified by the label. Determine in advance the proper safety equipment, protective clothing, and measuring equipment you will need for the pesticide task that you will be performing. The protective equipment necessary may include socks, shoes, long pants, long-sleeve shirt, and a hat. Additional safety equipment may also be required by the label. Consult the Precautionary Statements of the pesticide label for the minimum Personal Protection Equipment (PPE) required by law. See sections D 5.2 Personal Protection Equipment for Pesticides, and D 5.3 Respiratory Protection for Pesticide Handlers for further direction on selection and use of the protective equipment according to the pesticide label.

Make sure that all application equipment that will be used has been **properly maintained and calibrated, and is in good working order** prior to application.

Prior to application, be sure to **check the First Aid statements of the label**. Have any label-specified antidotes on hand in advance.

Your physician should be advised of the types of pesticides you use, in your work. They may determine the need for medical monitoring for continued use; this includes certain uses of cholinesterase-inhibiting organophosphate and N-methyl carbamate pesticides (*see box below*). When a pesticide is a cholinesterase inhibitor, this is identified in the First Aid statements of the label.

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When you will be using a pesticide that requires the use of a respirator, you will need to be medically evaluated and receive a medical clearance for your use of that respirator under its conditions of use. See section D 5.3 Respiratory Protection for Pesticide Handlers for details.

Prior to applying or otherwise handling pesticides, be sure to have a supply of clean water and liquid detergent available for drenching and washing in case of an accident. When the label requires eye protection, handler employers must provide at least one pint of water per handler in portable containers that are immediately available to each handler. Whenever a handler is mixing or loading a pesticide product whose labeling requires protective eyewear during handling (or is mixing or loading any pesticide using a closed system operating under pressure), the handler employer must provide at each mixing/loading site, at least one system that is capable of delivering gently running water at a rate of least 0.4 gallons per minute for at least 15 minutes; or at least six gallons of water in containers suitable for providing a gentle eye-flush for about 15 minutes.

### **Medical Monitoring Cholinesterase-inhibiting Pesticides\*:**

It is recommended that you advise your physician if: you will be using Class 1 and Class 2 organophosphates (OPs) and N-methyl carbamates; or simply OPs.

Monitoring of blood cholinesterase level is recommended for those who will be using these pesticides for greater than a total of 30 hours in 30 consecutive days. **Before the start of the spray season**, each applicator should have a baseline blood cholinesterase level determination. The level of blood cholinesterase should be re-evaluated using the same lab during the spray season when 30 hours use within 30 days is reached or exceeded.

*\*The Migrant Clinicians Network website “Cholinesterase Testing Protocols for Healthcare Providers” outlines protocols, when medical removal from the job is necessary, and return to duty can be allowed. See <https://www.migrantclinician.org/toolsource/resource/cholinesterase-che-testing-protocols-and-algorithm-healthcare-providers.html>*

## **4.2 Pesticide Application**

Always have the label readily available when applying a pesticide.

- Do **not** handle or apply pesticides if you have a headache or are not feeling well.
- **Never** smoke, eat or drink (or use cell phones) while handling pesticides.
- **Avoid** inhaling pesticide sprays, dusts, and vapors. If the pesticide is dangerous to your respiratory system, the label will tell you to wear a respirator and specify which type (see section D 5.3 Respiratory Protection for Pesticide Handlers).
- Thoroughly wash exposed areas of yourself before eating, drinking, using tobacco products, using the bathroom, or using your cell phone. Wash your gloves with soap and water before you take them off. Then wash your hands and face.
- If hands, skin, or other body parts become contaminated or exposed, wash the area immediately with clean water and a liquid detergent. If clothing becomes contaminated, remove it immediately. If you splash a concentrate of a pesticide labeled with a “Danger” or “Warning” signal word, take your contaminated clothing off immediately. Dispose of garments drenched with concentrates of any pesticides labeled with Danger or Warning signal words; do not wash these items.
- After each spraying or dusting, bathe and change your clothing; always begin the day with clean clothing. Wash contaminated clothing separately from other garments, and run an extra rinse cycle afterwards.  
Always have someone with you or close by if you are using highly toxic pesticides (those with the signal word **DANGER** plus skull and crossbones)

### **Application Rate**

**Always follow the pesticide label ‘Directions for Use’** regarding who may use, where, how, how much, and how often the pesticide may be used. In addition to those mandatory statements, pesticide manufacturers also provide additional advisory information on the label on how to use a pesticide most effectively.

### **Application Records**

Records document proper application. Records are one of the first things that regulators review when they have received a complaint. Consider treating each record as documentation of a lawsuit going forth in court. Always keep a record of all pesticides used (dates, locations, quantities, etc.) as required by your State regulator.

For Maryland, see University of Maryland “Pesticide Information Leaflet No. 14: Pesticide Record Keeping Requirements in Maryland” for more details and a template recordkeeping form provided by the Maryland Department of Agriculture; URL: [http://pesticide.umd.edu/uploads/1/3/5/6/13565116/pil14\\_recordkeeping\\_1991-2012.pdf](http://pesticide.umd.edu/uploads/1/3/5/6/13565116/pil14_recordkeeping_1991-2012.pdf). For New Jersey, there are legal requirements for what information must be included and how long application records must be maintained by licensed applicators. For application record templates, see Rutgers Pesticide Safety Education Program’s website at: <https://pestmanagement.rutgers.edu/pat/record-forms/>.

*See chapter G for a sample pesticide application record template. For additional information on pesticide application recordkeeping, contact your state pesticide regulatory agency or Cooperative Extension Pesticide Safety Education Program.*

### 4.3 Pesticide Transport

When pesticides are transported, containers must be well secured to prevent breakage or spillage. If pesticide containers are glass, pad and secure them to prevent breakage. When containers are larger than 5 gallons, tightly brace them to a structural part of the vehicle to prevent accidental spills. Carry a supply of absorbent material to soak up or contain any liquid spills. Keep a shovel and/or broom and pan in the transport vehicle to help quickly contain any spills. Carry a working fire extinguisher (10 - B: C dry chemical, or carbon dioxide) immediately accessible on board as well.

While under transport, pesticides must be stored in a separate compartment from the driver such as the bed of a pick-up truck or a van equipped with a partition. All pesticide containers and equipment must be secured to the vehicle so as to prevent removal by unauthorized person(s) when the vehicle is unattended. The door or hatch of any service vehicle tank containing a pesticide must be equipped with a cover that will prevent spillage when the vehicle is moving. The above requirements would not apply if the vehicle is being used to hold and/or transport pesticides within the boundaries of a private applicator’s property. **For additional information on pesticide transport, contact your state pesticide regulatory agency or Cooperative Extension Pesticide Safety Education Program.**

### 4.4 Pesticide Storage

Improper storage of pesticides can lead to accidental poisonings, contamination of the environment, and deterioration of the chemicals themselves. Pesticides should always be stored in their original containers and kept tightly closed. **NEVER** transfer pesticides to food or beverage containers. Store pesticides in a cool, dry, well-ventilated area that is not accessible to children and others who do not know and understand their safe and proper use. For the protection of others, and especially in case of fire, the storage area should be posted as *Pesticide Storage* regardless of the use classification, and kept securely locked.

Minimize the amount of product you need to store. Plan pesticide purchases so that supplies are used by the end of the growing season, and will not have to be overwintered. Write the purchase or delivery date of the product on the label with indelible ink on the product container. Check and record expiration dates listed on the product label. EPA regulations require that pesticide manufacturers must place the statement “**Not for sale or use after [date].**” on product labels where the formulation changes in chemical composition significantly in a prominent position on the label. The product must meet all label claims up to the expiration time indicated on the label.

**Always read the label.** Most, if not all, pesticide labels will contain a general statement such as “do not contaminate water, food, or feed by storage, disposal, or cleaning of equipment.” Special storage recommendations or restrictions will often be included. Moisture is a critical concern with dry pesticides, including granular materials and wettable powders, which have a strong affinity for water. When this is the case, the label may have the statement, “store in a dry place.”

**In New Jersey**, any restricted use pesticide (or empty containers still contaminated with their residues) must be stored in a secure, locked enclosure while unattended. That enclosure must bear a warning that pesticides are stored there. If any pesticide must be stored in other than its original container (for example if the original container is leaking), that container must be labeled with the brand or trade name; EPA registration number; name and percentage of the active ingredient(s); the signal word; and precautionary statements for the pesticide. If the pesticide in the new container has been diluted, also write the dilution of the mixture. Keep an inventory of all pesticides held in storage and locate the inventory list in an accessible place away from the storage site, so it may be referred to in case of an emergency at the storage site.

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**Keep your local fire department informed of the location of all pesticide storage locations.** Fighting a fire that includes smoke from burning pesticides can be extremely hazardous. A fire with smoke from burning pesticides may also endanger the people of the immediate area or community. The people of an area or community may have to be evacuated if the smoke from a pesticide fire drifts in their direction. In **New Jersey**, applicators are required maintain a list of pesticides in storage or likely to be stored during the license year. Applicators must send this inventory to their local fire department by May 1<sup>st</sup> each year. It must also include a written description or depiction of the exact location of the pesticide storage area. For inventory and cover letter templates, see Rutgers Pesticide Safety Education Program's website at: <http://pestmanagement.rutgers.edu/pat/record-forms/>.

### **Inspect Product and Container Conditions**

Inspect the condition of products stored and containers you have in storage routinely. Maintain pesticides within the temperature range specified on the product label. Poor storage practices impact product efficacy, and accelerates product deterioration.

#### **General signs of deterioration per formulation type are:**

- EC - Evidence of separation of components, such as sludge or sediment. Milky appearance does not occur when water is added.
- Oils - Milky appearance does not occur when water is added.
- WP, SP, WDG - Excessive lumping; powder does not suspend in water.
- D, G, WDG - Excessive lumping or caking

Consult the "Storage and Disposal" statements listed on the label to determine whether a pesticide can freeze with no adverse effects. Some pesticide labels may indicate that if freezing occurs and crystals form, then the product may be reused if it is warmed up. After freezing, the pesticide container should be checked to make sure it is not ruptured or cracked from the expansion of the frozen liquid **BEFORE** attempting to thaw the pesticide. To thaw a pesticide, place the container in warm storage, 50-80°F (10-27°C), and shake or roll the container every few hours to mix product or eliminate layering. If layering persists or if all crystals do not completely dissolve, do not use product. If in doubt, call the manufacturer for guidance. Additional information can be obtained from manufacturers' websites, or consult "Cold Weather Storage & Handling of Pesticides, January 2018" by the Montana State University Extension, available at:

<https://store.msuxextension.org/publications/AgandNaturalResources/MT201801AG.pdf>.

See section D 4.5 below regarding disposal of deteriorated product.

## **4.5 Disposal of Pesticides**

Pesticides (and their empty containers still containing residues) should not be disposed of in sanitary landfills or by incineration, unless disposal sites and equipment are especially designed and licensed for this purpose by your state.

**Always refer to the current pesticide label "Storage and Disposal"** requirements because there may be product-specific requirements on the disposal of pesticides themselves or unrinsed containers or rinsate. Pesticide labels now have specific directions on disposal for non-refillable and refillable containers.

Pesticide wastes may be hazardous. Improper disposal of excess pesticide, spray mixture or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

For non-refillable bags of granulars and powders, completely empty bag into application equipment by shaking and tapping sides and bottom to loosen clinging particles. If not emptied in this manner, the bag may be considered an acute hazardous waste and must be disposed of in accordance with local, state, and federal regulations.

After emptying a product container, triple rinse container (or equivalent) promptly. The **triple rinse-and-drain** procedure or the **pressure-rinse** procedure are recommended methods to prepare pesticide containers for recycling or (see section D 4.6 below).

**Virginia's Pesticide Collection Program** assists agricultural producers, licensed pesticide dealers, pest control firms, golf courses and homeowners with the proper disposal of unwanted pesticides. The program is an effort by the Virginia Department of Agriculture and Consumer Services (VDACS), with participation from Virginia Cooperative Extension and the Division of Consolidated Laboratory Services. Pre-registration is required; see <https://www.vdacs.virginia.gov/pesticide-collection.shtml> online for form and details.

The Environmental Sweep Program (ESP) is a new initiative by the **Delaware Department of Agriculture** that offers to all three counties easy and environmentally responsible disposal of unwanted, outdated or cancelled pesticides for free to qualifying individuals and businesses. Farmers, commercial applicators, nurseries, green houses, golf courses and pest control businesses can qualify for the free removal of up to 500 pounds or 50 gallons of pesticides through this program. For convenience and safety, pesticides will be picked up directly from your site by a waste disposal contractor. For more information see <https://agriculture.delaware.gov/pesticide-management/environmental-sweep-program/>. Please contact Jimmy Hughes at (302) 698.4569 or Chris Wade at (302) 698.4570.

The **Maryland Department of Agriculture** (MDA) sponsors a free pesticide disposal program; see <https://mda.maryland.gov/plants-pests/Pages/Pesticide-Disposal-Program.aspx>. For growers to participate in the program, they must complete and return to MDA a Disposal Program Registration Form obtained from MDA or from the participating county office of the Maryland Cooperative Extension Service (MCES). See *chapter G for Contact Information*.

The **Pennsylvania Department of Agriculture** CHEMSWEEP provides **Pennsylvania** farmers and other licensed pesticide applicators with a means to dispose of canceled, suspended or unwanted pesticide products. Through CHEMSWEEP, applicators can legally dispose of unwanted pesticides, generally at little or no cost. Almost all of the waste pesticides collected are burned in EPA-approved incinerators. The remaining pesticides are treated and placed in EPA-permitted hazardous waste landfills. Registration forms are online and due by February 28<sup>th</sup>; for more details, see [https://www.agriculture.pa.gov/Plants\\_Land\\_Water/PlantIndustry/health-safety/environmental-programs/Pages/CHEMSWEEP%20Waste%20Pesticide%20Disposal%20Program.aspx](https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/health-safety/environmental-programs/Pages/CHEMSWEEP%20Waste%20Pesticide%20Disposal%20Program.aspx).

Although the **New Jersey** Department of Agriculture does not sponsor pesticide waste disposal, it does promote recycling of “empty” pesticide containers (see section D 4.6 below).

## 4.6 Disposal of Pesticide Containers

Recycling or drum reconditioning are preferred disposal options for container disposal. Options for empty pesticide containers depend upon state or local regulations and ordinances (and recycling program availability). Crushed/punctured containers may be accepted by sanitary landfills or landfills that accept industrial waste. Check with landfill operators prior to taking empty containers for disposal.

For dilutable pesticides in rigid non-refillable containers, the label must include triple rinse instructions unless EPA waives the requirement. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal.

Acceptable methods to prepare non-refillable containers that contained dilutable pesticides for recycling and/or disposal are **triple rinsing-and-draining** or **pressure-rinsing, as follows**:

**Triple Rinse-and-Drain Method** (for refillable containers larger than 5 gallons): To empty a pesticide container for disposal, drain the container into application equipment or mix tank by holding container in a vertical position for 30 seconds. Add a solvent, capable of removing the pesticide, to the pesticide container, so that it is approximately one-fourth full. Agitate the container thoroughly, and then drain the liquid (rinsate) into the application equipment or mix tank by holding in a vertical position for 30 seconds. Repeat two more times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal.

**Pressure Rinse Method**: An optional method to rinse small pesticide containers is to use a special rinsing device on the end of a standard water hose. The rinsing device has a sharp probe to puncture the container and several orifices to provide multiple spray jets of water. After the container has been drained into the sprayer tank (container is upside down), jab the pointed pressure rinser through the bottom of the inverted container. Rinse for at least 30 seconds. The spray jets of water rinse the inside of the container and the pesticide residue is washed down into the sprayer tank for proper use. Thirty seconds of rinse time is equivalent to triple rinsing. An added benefit is the container is rendered unusable. In **Pennsylvania**, this permits the containers to be disposed of as solid waste (not hazardous waste) in an ordinary landfill.

The **Delaware** Pesticide Section, in cooperation with the Ag Container Recycling Council (ACRC), provides an empty pesticide container recycling program in the State of Delaware:

<https://agriculture.delaware.gov/pesticide-management/calendar/>.

The **New Jersey Agricultural Recycling Programs** are promoted by the New Jersey Department of Agriculture (NJDA). Pesticide container disposal is offered to agricultural, professional and commercial pesticide

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applicators who hold a NJDEP pesticide license as well as state, county and municipal government agencies. One core credit will be given to pesticide license holders who follow required processing steps and bring their license with them at time of collection. The program accepts non-refillable, high-density polyethylene #2 (HDPE) containers that are no larger than 55 gallons and that have been triple rinsed. Contact Tim Fekete of the NJDA Division of Agricultural and Natural Resources for more details on recycling requirements, scheduling, and locations at (609) 292-5540, or consult the NJDA website at:

<https://www.nj.gov/agriculture/divisions/anr/nrc/recycling.html>

Helena Chemical in Woodstown and Hammonton will be two of the locations for the 2020 season.

**Always refer to the current pesticide label “Storage and Disposal” requirements.** For additional information on the disposal of pesticides themselves or unrinsed containers or rinsate, call your State agency responsible for hazardous waste.

## 5. Reducing Risks to Handlers and Workers

### 5.1 EPA’s Worker Protection Standard

EPA first implemented the Federal Worker Protection Standard – CFR Title 40, Part 170 (WPS) regulations in 1994. provide specific safety requirements for both pesticide handlers and general agricultural workers. The 1992 WPS regulations were revised on November 2, 2015. **State regulations may differ, and when more stringent take precedence over federal regulations.**

“**Handlers**” are those persons who are employed by an agricultural establishment or commercial pesticide application company who mix, load, or apply pesticides; who handle opened pesticide containers; who act as flaggers; who clean, maintain, or repair application equipment; who assist with the application of a pesticide; who enter a treated greenhouse to operate ventilation equipment; who adjust or remove coverings or check air levels; who enter an outdoor area that has been fumigated to adjust or remove soil coverings; who perform tasks as a crop advisor; or who dispose of pesticides or their containers. The Revised WPS requires that handlers, with the exception of immediate family, be **at least 18 years old**. New Jersey labor laws are more stringent, and minors under 18 years old cannot be employed as applicators of pesticides or be permitted in any area where pesticides are applied.

“**Agricultural Workers**” are those persons who are employed by the agricultural establishment to perform tasks such as harvesting, weeding, or watering, relating to the production of agricultural plants on a farm, forest, nursery, or greenhouse.

The WPS regulations are applicable to any agricultural establishment that employs either pesticide handlers or agricultural workers where **any EPA-registered pesticides** are used in the production of agricultural commodity(ies). The WPS also applies to custom pesticide applicators and labor contractors supplying employees or independent crop consultants who are hired by these establishments.



#### AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. Refer to supplemental labeling under “Agricultural Use Requirements” in the Directions for Use section for information about this standard.

Only “WPS-labeled” pesticides may be used in the production of an agricultural commodity. These pesticides are identified by a box on the product label with the title “**AGRICULTURAL USE REQUIREMENTS**”. The first paragraph within the box **invokes by reference a requirement for compliance with the all of the WPS regulations**. Specifically, the paragraph reads: “Use this product

**only in accordance with labeling and with the Worker Protection Standard 40 CFR part 170.** The Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to statement on the label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered under the Worker Protection Standard...”

**This section provides a brief overview of some of these regulations.** Compliance resources for regulation specifics and other information are provided at the end of this section. The WPS reduces risks of occupational illness and injury from exposure to pesticides in three ways:

- **Inform** workers and handlers about potential exposures to pesticides;
- **Protect** worker, handlers, and others from exposure to pesticide(s); and
- **Mitigate** any pesticide exposures that workers or handlers receive.

**Information.** To ensure that employees are informed about exposure to pesticides, employers must provide certain information to their farmworkers. This includes providing **annual pesticide safety training** to both pesticide handlers and agricultural workers. Grace period for worker training is eliminated. Workers must be trained before they work in an area where a pesticide has been used or a restricted-entry interval has been in effect in the past 30 days.

Training content under the 2015 Revised WPS has expanded, and is freely available (*see “Compliance Assistance” at the end of this section for free training resources, including videos*). Worker training topics have been expanded to 23 items, and handler training has been expanded to 36 items. Resources developed for the training of workers and handlers per the requirements of the 1992 Worker Protection Standard (as amended) can no longer be used, effective December 2018. Training of employees using the old materials does NOT have the new content required under the 2015 Revised WPS, and would be invalid. Do not use training materials unless they are approved for use with the 2015 Revised Worker Protection Standard.

**IMPORTANT: Make sure to replace your old 1992 WPS training videos or booklets with 2015 Revised WPS training materials!**

Trainers must be either: certified applicators; designated as a qualified trainer by EPA or their state pesticide regulatory agency; or have completed an EPA-approved “Train the Trainer” course. Approved trainers must use EPA-approved training materials. Employers are required by federal regulations to retain records of WPS training for 2 years. **State WPS training recordkeeping regulations may be more stringent;** the NJDEP Worker Protection website has forms for trainer recognition, worker training records, and handler training records; *see <http://www.nj.gov/dep/enforcement/pcp/pcp-wps.htm>* for forms and retention times and responsible parties.

Other requirements for providing information include **displaying WPS-required pesticide safety information** at a central location (and certain decontamination sites). Safety information may be displayed in any format, including a poster that meets the requirements (*see the PERC WPS safety information poster at: <http://pesticideresources.org/wps/cp.html>*).

Agricultural employers must also provide workers and handlers access to both Safety Data Sheet (SDS) and **pesticide application information** for applications at the establishment. An SDS is required to have specific information set forth by the OSHA Hazard Communication Standard, but they are not reviewed or approved by government officials like pesticide labels.

EPA Revised WPS requires that the following pesticide application information be displayed in a centrally located area:

1. Pesticide product name, EPA registration #, and active ingredient(s);
2. Crop or site treated, & location and description of treated area;
3. Date(s), times application started and ended; and
4. Duration of REI.

EPA requires that employers maintain SDS and pesticide application information on file for two years and provide access/copies of records to workers, handlers, treating medical personnel, or a “designated representative”. **State regulations may differ; where more stringent, they take legal precedence over federal requirements.**

**New Jersey** has additional display requirements including posting a map of the farm for designation of treated areas. NJDEP column headings for posted pesticide application information include: 1) Crop; 2) Pesticide name; 3) Safe Reentry Time; 4) Application Date; 5) Application start and finish times; and 6) Application Location. This application information must be displayed either before workers enter treated fields or prior to workers entering fields at the beginning of the next workday, whichever occurs first. Once posted, this information must remain posted for 30 days following the date for safe reentry.

**Protection.** Employers are required to ensure that employees will be protected from exposures to pesticides. Employers must take measures that applications do not expose unprotected workers during applications. The



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Revised WPS has requirements for restricting access around application equipment in a defined area called the “**Application Exclusion Zone**” surrounding applications in progress. Employers must also provide personal protective equipment (PPE) to handlers, and early entry workers per the pesticide label (see sections D 5.2 and 5.3 for information on PPE).

Employers must notify early-entry workers of application specifics, tasks to be performed, conditions of the early-entry exception, and hazard information from the pesticide label.

All WPS-labeled pesticide products are required to have a prescribed REI. These range from 4 to 48 hours or longer. Check your pesticide's label for the reentry time in effect. Some pesticides have one REI, such as 12 hours, for all crops and uses. Other products have different REIs depending on the crop or method of application. When two (or more) pesticides are applied at the same time, and have different REIs, you must follow the longer interval.

To protect farmworkers, employers are required to **post warning signs** (see right) around treated areas when the **product applied outdoors has an REI greater than 48 hours**; and when the **product applied indoors has an REI greater than 4 hours**. When a product applied outdoors has an REI of 48 hours or less; or a product applied indoors has an REI of 4 hours or less, the employer may choose either to post the treated area or give oral notification, unless the labeling requires both types of notification.

However, there are situations where the WPS allows workers to enter treated areas before the end of an REI to do non-hand labor tasks, and is limited to a maximum of one hour per day. Early entry cannot be made until four full hours have passed since the completion of the application. The Revised WPS requires that “early-entry workers”, with the exception of immediate family, be at least 18 years old. Note: New Jersey regulations require that both handlers and early entry workers be at least 18 years old. Early-entry workers must be given label-prescribed PPE for early entry prior to entry if they will contact treated surfaces.



**Mitigation.** To mitigate or lessen the impact of pesticide exposures that employees do receive, employers must provide decontamination sites and emergency assistance. Employers must provide supplies for emergency eye flush at all pesticide mixing and loading sites when handlers use products that require eye protection. Decontamination sites must contain a supply of water, soap, and towels for both routine washing and emergency decontamination. Employers must provide emergency assistance which includes transportation to medical care facilities in the event of a pesticide-related injury, and providing information about the pesticide(s) involved to the medical staff.

**Immediate Family Exemptions:** The Revised WPS has expanded the definition of immediate family to include: spouse, parents, stepparents, foster parents, father-in-law, mother-in-law, children, stepchildren, foster children, sons-in-law, daughters-in-law, grandparents, grandchildren, brothers, sisters, brothers-in-law, sisters-in-law, aunts, uncles, nieces, nephews, and first cousins.

Owners of agricultural establishments and their immediate family members are exempt from most WPS requirements. Also family members are not exempt from the respiratory protection requirements for those that will be using pesticides requiring respirators to be worn (*see section D 5.3 for details*).

If only immediate family members are employed by the agricultural establishment, owners are exempt from providing themselves and their family members:

- pesticide safety training and information;
- providing, cleaning, and maintaining PPE;
- information at a central location;
- decontamination facilities;
- emergency assistance requirements;
- notifications of pesticide applications; and
- handler monitoring.

**Note:** *EPA adopted a subset of OSHA's Respiratory Protection [OSHA 1910.134] requirements. The Revised WPS requires that when a WPS-covered pesticide label requires a handler to wear a respirator, the handler's employer must provide them with a medical evaluation, fit test, and respirator training. EPA's WPS does not exempt owners of agricultural establishments from providing themselves or their family members these requirements.*

### **Federal Compliance Assistance**

EPA is providing resources to agricultural employers and handler employers to assist with compliance with the Revised WPS in conjunction with the Pesticide Educational Resources Collaborative (PERC).



Key resources developed and posted at the PERC website ([http://pesticideresources.org /](http://pesticideresources.org/)) are:

- “Quick Reference Guide to the Worker Protection Standard (WPS) as Revised in 2015”; see <http://pesticideresources.org/wps/hosted/quickrefguide.pdf>. This one-page double-sided chart outlines requirements with direct hyperlinks to the text of the regulation for each item being cited in the chart.
- “How to Comply With the 2015 Revised Worker Protection Standard For Agricultural Pesticides”; see <http://pesticideresources.org/wps/htc/index.html>. The purpose of this online guide is to help users of agricultural pesticides comply with the requirements of the revised federal Worker Protection Standard.
- The Revised WPS requires that specific pesticide safety information with newly expanded content be accessible to workers at any time during normal work hours. EPA does not require a specific format. PERC has produced an updated “WPS Safety Poster” for “Central Posting” areas and certain decontamination sites. These may be downloaded from <http://pesticideresources.org/wps/cp.html>, or purchased from the National Pesticide Safety Education Center’s online store at <https://npsecstore.com/pages/perc-page>.

**PERC** will use email distribution lists to keep interested parties informed about new publications. PERC has developed lists for several target groups, including “Agricultural Employers and Handler Employers” to distribute notices relevant to agricultural employers and commercial pesticide handler employers, as defined by the WPS. See <http://pesticideresources.org/lists.html> to enroll in the email list(s) of your choice.

PERC is collaborating with the National Pesticide Safety Education Center (NPSEC) as its distributor for printed resources and posters. You can purchase printed copies of PERC’s resources, including laminated WPS Safety Posters, at the NPSEC Store at <https://npsecstore.com/>.

Contact your local Extension offices and state Extension Pesticide Safety Education Program (PSEP) for further assistance. Some state PSEP Programs, such as Rutgers New Jersey PSEP, will be providing WPS outreach to agricultural producers at conferences, meetings, its Worker Protection webpages at: <https://pestmanagement.rutgers.edu/worker-protection/> and the Rutgers NJAES Plant and Pest Advisory Commercial Agriculture blog.

**Please refer to your State pesticide regulatory agency for state-specific regulations and policy on the Revised WPS. In cases where state rules are more stringent than federal, the state rules will take primacy.**

### **Final Revised New Jersey Pesticide Regulations – Expected Spring 2020**

The NJDEP Worker Protection regulations [N.J.A.C. 7:30 Subchapter 12] regulations (available at: <https://www.nj.gov/dep/enforcement/pcp/regulations/Subchapter%2012.pdf>) provide New Jersey’s regulations for Worker Protection. Prior to EPA’s revision of the WPS in 2015, New Jersey’s Agricultural Worker Protection were more stringent than EPA’s 1992 WPS (as amended).

EPA’s 2015 revision of the WPS now includes many of the requirements of New Jersey’s existing regulations. Revised Federal regulations take primacy when New Jersey Department of Environmental Protection regulations are less stringent, and vice versa. However, there are instances where the two rules differ and require interpretation.

The NJDEP proposed revision of their pesticide regulations at N.J.A.C. 7:30 for the Pesticide Control Code on May 20, 2019. The revisions to N.J.A.C. 7:30 incorporate new federal requirements not previously addressed by New Jersey regulations. Additionally, the revisions addressed conflicts between the State and federal rules. A copy of the proposal is available from the NJDEP website at [www.nj.gov/dep/rules/proposals/20190520a.pdf](http://www.nj.gov/dep/rules/proposals/20190520a.pdf). The finalized rule will be published in the New Jersey Register. Currently, NJDEP expects that implementation of the final revised N.J.A.C. 7:30 rule will be in early spring 2020. Rutgers will announce this via its NJAES WPS blog, and update its WPS website accordingly.

For specific questions or concerns about NJDEP’s implementation of the revised WPS, please contact Supervisor of the Worker Protection Unit Nancy Santiago at 609-984-6568, or contact her by email at [pcp@dep.nj.gov](mailto:pcp@dep.nj.gov).

## **5.2 Personal Protective Equipment (PPE) for Pesticides**

Wearing PPE can greatly reduce the potential for dermal, eye, oral, and inhalation exposure; and thereby significantly reduce the chances of pesticide poisoning or injury. PPE includes such items as coveralls or protective suits, aprons, gloves, footwear, headgear, eyewear, and respirators. When selected correctly, these all reduce the risk of dermal exposure; but they do not eliminate it. All PPE should either be disposable, or easy to clean and sturdy enough for repeated use.

### **Coveralls**

If the pesticide label only lists ‘coveralls’, it is allowable to wear a coverall made of any fabric, including wovens (like cotton or twill); as well as disposable non-wovens. These do not have to be chemical resistant.

### **Chemical Resistant PPE**

Generally speaking, labels will specify PPE that is “chemical resistant” for protecting the body from moderately toxic (signal word ‘Warning’) or highly toxic (label signal word ‘Danger’) pesticides. However, that may not always be the case for specific products; always follow the label.

It is important that all pesticide handlers understand the limitations of PPE. Different types of PPE are not equally resistant to all pesticides and under all conditions. Chemical resistance of a given protective suit, for instance, can vary between different pesticides. Some materials restrict pesticide entry for a long time, while others allow the pesticide to pass through quickly.

There are several criteria for chemical resistance: penetration, degradation, and permeation. Penetration occurs when the chemical leaks through seams, pinholes, and other imperfections in the material. Degradation is a reduction in one or more physical properties of PPE due to contact with a chemical; it essentially starts to break down. Permeation is the process by which a chemical moves through protective material on a molecular level; measured as a volume per area overtime. Breakthrough is what occurs when there is complete passage of a pesticide to the inside of PPE, measured in elapsed time. Once this occurs, your skin is directly exposed to the pesticide.

In some instances, degradation of protective fabric is easy for applicators to recognize. PPE may swell, discolor, shrink, soften, become brittle, or change texture. Be alert for these signs and replace compromised clothing immediately to minimize your exposure to pesticides.

Permeation of a pesticide into a material may begin as soon as it gets on its surface. Once a pesticide is absorbed onto the surface of a garment, it is difficult to detect or decontaminate. In these cases, the pesticide continues to move into and through the PPE. How fast a given pesticide moves through different PPE materials (its permeation rate) can vary widely. Things that can affect the extent of permeation are contact time, concentration, temperature and physical state of the contaminant.

Pesticide breakthrough of PPE can occur without any noticeable signs. If a material is not chemical resistant to a pesticide, complete passage through it can occur very quickly, in just minutes.

Pesticide residues that remain on PPE are likely to continue to permeate through the material once contaminated. If using “reusable” PPE, pay close attention and be ready to change them whenever the inside surface is contaminated or there are signs of pesticide permeation. Even if you do not see any signs of wear, replace reusable chemical-resistant items regularly - the ability of a chemical-resistant material to resist the pesticide decreases each time an item is worn.

Be sure to clean all reusable PPE items between uses, even if worn for only a brief period of exposure. If you wear that PPE again, pesticide may already be on the inside of the material next to your skin. In addition, PPE worn several times between launderings may build up pesticide residues. The residues can reach a level that can harm you, even if you are handling pesticides that are not highly toxic.

Disposable PPE is a preferred option to reusable PPE. They are low-cost, and their use minimizes clean-up and spread of contamination.

### **Selecting chemical resistant PPE**

Always follow the pesticide label directions for what is required for you to use under the law. For pesticide handlers, the precautionary statement on the pesticide label indicates if chemical-resistant PPE is required. For workers performing “early entry” tasks, the Agricultural Use Requirements box on the label indicates PPE requirements.

For gloves, labels will often specify materials that are chemical resistant for that product. Older pesticide labels may add another statement that you can consult an EPA chemical resistance category chart for more options. In these cases, the glove type that provides highest protection is listed. Use only those listed.

In some cases, a pesticide label may say “wear chemical-resistant PPE” without specifying the material that protects you. This is more typically the case for suits, aprons, boots, and headgear. In these circumstances, you should consult the PPE manufacturer or their literature (often available online). They can recommend the best garments/gloves to wear with the pesticide that you will be using. Consult the pesticide manufacturer to find out what PPE they recommend to be chemical resistant. You can also contact your state Cooperative Extension pesticide safety office for assistance.

### Gloves

The area of the body receiving most exposure from pesticides is hands and forearms. Research has shown that workers mixing pesticides received 85 percent of the total exposure to the hands and 13 percent to their forearms. The same study showed that wearing chemical-resistant gloves reduced exposure by 99 percent (*Source: The Farm Family Exposure Study, John Acquavella*).

Wear the type of chemical-resistant glove specified by the product labeling. Select glove materials according to the label, or by chemical resistance charts, or manufacturer directions. Make sure not to use gloves made of any kind of absorbent material, leather, cloth, cloth-lined, or flocked, unless specified by the label. All of these materials can absorb pesticides, and hold them against your skin. Cotton gloves may be prescribed on the label in very specific uses such as protection for certain fumigants including aluminum phosphide. Always use label-prescribed gloves.

Gloves, non-woven (including coated non-woven) coveralls and hoods, such as Tyvek®, usually are designed to be disposed of after use. Most are intended to be worn for only one work day. For example, you might use disposable gloves, shoe covers, and an apron while pouring pesticide into a hopper or tank, cleaning or adjusting a nozzle, or making minor equipment adjustments. Place disposable PPE in a separate plastic bag or container prior to disposal.

### Footwear

Pesticide handlers often get pesticides on their feet. Sturdy shoes and socks may be sufficient to protect your feet during many handling activities. However, some product labels require that you wear waterproof or chemical-resistant footwear.

If the product labeling specifies “chemical-resistant footwear”, you can wear any chemical-resistant shoes; boots; or shoe coverings worn over shoes or boots. Leather or canvas footwear is not chemical resistant; they absorb pesticides and cannot be decontaminated. Do not wear leather boots in these cases.

### Eye Protection

Eyes readily absorb pesticides. When a label simply says to “wear protective eyewear”, you may use any of the following: goggles; face shield; safety glasses with shields at front, brow and temple; or a full-face respirator. Select goggles made of impact-resistant material such as polycarbonate. Goggles that have covered air baffles reduce lens fogging while keeping liquids out. Under the agricultural Worker Protection Standard, if the label requires eye protection, then the handler must have immediate access to eyewash of 1 pint of water at all times.

## **5.3 Respiratory Protection for Pesticide Handlers**

Occupational users of pesticides can be exposed to toxic gases and vapors, particulates, or both. Various pesticide formulations, environments, and application methods require different types of respiratory protection devices (respirators).

EPA requires that pesticide manufacturers determine and specify respiratory protection according to the anticipated hazards and risk of inhalation. Manufacturers provide requirements for respiratory protection on the pesticide label that are product- and task-specific. **It is extremely important** to read and follow the product label for respirator requirements since pesticides may have different formulations and use directions.

The pesticide label states whether you must use a respirator and, if so, which type. Atmosphere-supplying respirators provide clean, breathable air from an uncontaminated source, while air-purifying respirators remove contaminants from the air that you breathe. Both may be configured with either tight- or loose-fitting face pieces. When a tight-fitting respirator is used, **fit testing** is required to select the correct size, model, and manufacturer.

Occupational users of pesticides must understand the capabilities and limitations of each respirator they will use.

The pesticide label specifies use of “**NIOSH-approved**” respirators. The NIOSH-approval certificate that accompanies the respirator indicates the approved configuration, protection, and cautions and limitations of the

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respirator. For example, air purifying respirators do not supply oxygen, and must not be used in an environment containing less than 19.5% oxygen.

When air-purifying respirators are required, the label will specify the type of particulate filter and/or chemical cartridge or canister. For example, non-powered particulate filters differ according to their oil resistance. When a pesticide contains oil or an oil-like substance, an N-series (not oil proof) cannot be used; and the pesticide label will specify R-series (oil-resistant) or P-series (oil-proof) filters. Powered air purifying respirators only have a single type of particulate filter, HE. EPA regulations [40 CFR 170.507(d)] require replacement of particulate filters when damaged, torn, soiled, or it becomes uncomfortable for the wearer to breathe. Additionally, particulate filters should be replaced according to respirator manufacturer recommendations or pesticide labeling (whichever is more frequent).

Always use the type of purifying element required by the pesticide label. The most typical chemical cartridge or canister specified by the label for pesticide use is an organic vapor (OV) cartridge or canister. They contain activated carbon that adsorbs organic vapor gas or vapor molecules from the air being drawn in through the container. A chemical cartridge/canister is effective until the sorbent bed is filled and the gas or vapor “breaks through.” Breakthrough is the penetration of a gas or vapor through a chemical air-purifying element to inside the wearer’s mask. Any taste, smell, or irritation is a warning that breakthrough of the pesticide through the sorbent may have occurred, and that you should exit the area. Respirator manufacturers recommend that OV cartridges/canisters should not be used beyond one day. Change cartridges/canisters earlier if contaminant odor, taste, or irritation is detected inside the face piece.

The Revised WPS requires that when a WPS-covered pesticide label requires a handler to wear a respirator, the handler’s employer must provide them with a medical evaluation, fit test, and respirator training.

Prior to use of respirators, users must be **medically evaluated** to determine that they can safely use the respirator under the conditions of use. When use of a respirator is required by the pesticide label, both commercial applicator and agricultural employers must provide pesticide handlers a medical evaluation per OSHA 29 CFR 1910.134(e) to determine their ability to safely use the respirator specified.

**Annual respirator training** is required. Employers of occupational users of pesticides must provide effective respirator training per OSHA 29 CFR 1910.134(k) to those employees required to wear respiratory protection by the product label. Respirator users must know how to properly inspect, recognize danger signals during use and what to do; don and doff (put on and remove). After use, proper care, maintenance, and storage of their respirator can prolong the life of the respirator.

Consult **Rutgers Bulletin E0358 “Respiratory Protection for Occupational Users of Pesticides”** for detailed guidance on the different types of respirators; their limitations, use, care, maintenance, and storage; as well as requirements for the medical evaluation, fit testing, and training of respirator users. It outlines regulatory requirements of EPA and OSHA that apply to commercial users and also agricultural operations that use pesticides. The publication may be downloaded at <https://njaes.rutgers.edu/pubs/publication.php?pid=E358>; hardcopies are available at the NPSEC online store at <https://npsecstore.com/collections/rutgers>.

Contact your Cooperative Extension Pesticide Safety Education Program for assistance in selecting the correct respirator and any component parts from the pesticide label.

**Call your state’s Extension office to refer you to the Pesticide Safety Education Program Coordinator or Program if you have any questions about pesticide safety equipment.**

## 6. Protect the Environment

Generally speaking, to protect the environment from pesticide exposure,

- Always read the pesticide label prior to selection of a pesticide, and check for environmental concerns and restrictions.
- Do not burn pesticides. The smoke from burning pesticides is toxic and can pollute air.
- Do not dump pesticides in storm sewers or sewage disposal because this will contaminate water.
- Avoid using excess quantities of pesticides. Calibrate your sprayer to make sure of the output.
- Adjust equipment to keep spray on target. Chemicals that drift or move off-target can pollute and do harm to fish, wildlife, honeybees, and other desirable organisms.
- Keep pesticides out of ponds, streams, and water supplies, except those intended for such use. A small amount of drift can be hazardous to food crops and to wildlife.

- When cleaning or filling application equipment, do not contaminate streams, ponds, or other water supplies. Empty and clean sprayers away from water areas.
- Protect bees and other beneficial insects by choosing the proper chemical and time of day for application.
- See additional precautions in section D 6.2 “Protecting Your Groundwater.”

### **Minimize Spray Drift**

Avoid drift to non-target areas. When pesticide drift occurs, some part of the pesticide is not reaching its intended target, and the potential benefit from the application is reduced. Dusts drift more than liquid sprays; air blast sprays drift more than boom sprays. Generally speaking, to minimize off-target drift:

- Use lowest spray pressure and largest droplets that provide sufficient coverage and control.
- Choose days with better weather. Avoid spraying when windy, high temperature without low humidity, or inversion conditions. Spray when soil is coolest and relative humidity is highest.
- Do not use nozzles or nozzle configurations that produce small droplets; consider use of “low drift” nozzles.
- Adjust boom height as low as is practical.
- Use lower travel speeds.
- Use non-volatile pesticides
- Use drift control additives when permitted by the pesticide label.

**ALWAYS READ AND FOLLOW THE PESTICIDE LABEL.** Pesticide labels will have mandatory drift requirements, as well as manufacturer’s advisory statements for best management practices to control drift. This may include application methods, droplet size, nozzle types, and tank mix partners.

## **6.1 Protection of Pollinators**

**ALWAYS READ AND FOLLOW THE PESTICIDE LABEL.** Based upon the results of required ecological risk assessment or incident reports, the Environmental Hazards statements for foliar application to agricultural crops must include use precautions and/or restrictions for **all identified non-target** birds, mammals, fish, aquatic invertebrates, and bees.

In some cases, EPA may require product-specific labeling to protect non-targets, such as pollinators. This would include foliar applications to alfalfa, peas, or beans if the crop or weeds in treatment area are in bloom; or to corn during pollen shed. In 2014, EPA required that all manufacturers of pesticide products containing active ingredients from the neonicotinoid group of insecticides relabel these products with an **advisory “pollinator protection box”** advising users to look for restrictions on the product’s use indicated with a “bee icon” (*see right*). **Mandatory product-specific pollinator protection “Directions for Use”** were required on the label.



*Neonicotinoid Pesticide Labels:  
EPA Pollinator Protection “Bee Icon”*

Generally speaking, pesticide applicators must take measures that will minimize the risk of pollinators contacting a “bee-toxic” pesticide. “Bee-toxic” pesticides are those pesticides that have information on the label indicating that the pesticide is toxic to bees, and precautionary statements for the protection of pollinators on the product labeling.

**Do not** apply or allow drift of bee-toxic pesticides until all flowering of crop, cover crops, or weeds is complete/petal fall, unless you take necessary precautions to minimize exposure to foraging bees or and their hives. **Do not** apply bee-toxic pesticides when bees are foraging in cover crops or weeds. Precautions may include: making applications after sunset, when the temperature has dropped below 55°F, and notifying beekeepers in advance. Notification of beekeepers allows them to move, cover, or otherwise protected prior to spraying. This protects a valuable agricultural resource, and avoids conflicts and possible lawsuits. **Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at:**

*<http://pesticidestewardship.org/PollinatorProtection/Pages/default.aspx>*

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### **State-Specific Pollinator Protection**

Some states have completed or are in the process of implementing State Managed Pollinator Protection Programs (MP3s). MP3s are typically voluntary. Consult your State Apiarist or Department of Agriculture for your State requirements.

The **Pennsylvania** Pollinator Protection Plan (P4) provides recommendations for best practices and resources to support and expand pollinator populations; see <https://ento.psu.edu/pollinators/pollin-spotlight-items/the-pennsylvania-pollinator-protection-plan-p4>.

The **Virginia** Department of Agriculture and Consumer Services has a State Pollinator Protection Plan at <https://www.vdacs.virginia.gov/plant-industry-services-pollinator-protection-plan.shtml> that includes Best Management Practices for Agricultural Producers and Agricultural Commercial Applicators.

The **Maryland** Department of Agriculture has released its Maryland Pollinator Protection Plan at [http://mda.maryland.gov/plants-pests/Pages/pollinator\\_protection\\_plan.aspx](http://mda.maryland.gov/plants-pests/Pages/pollinator_protection_plan.aspx).

The **West Virginia** Department of Agriculture released its Pollinator Protection Plan in March 2016. at <https://agriculture.wv.gov/SiteCollectionDocuments/WVPollinator.pdf>.



The **Delaware Department of Agriculture** is now offering an online tool that helps protect pesticide-sensitive crops and commodities from pesticide drift. DriftWatch™ is designed to help pesticide applicators, specialty crop growers and stewards of at-risk habitats to communicate more effectively to protect pesticide-sensitive areas. DriftWatch is free for both growers and applicators. Go to [www.driftwatch.org](http://www.driftwatch.org) to register.

You can also learn more about DriftWatch™ at [www.fieldwatch.com](http://www.fieldwatch.com). For questions or assistance with registering, please contact: Laura Mensch, Data Steward via phone at (302) 698-4573 or email at [laura.mensch@delaware.gov](mailto:laura.mensch@delaware.gov).

**New Jersey Beekeeper Notification Regulations (7:30-9.11).** Beekeepers that have hives overwintering in New Jersey are allowed to voluntarily register their bee yards with the NJDEP. A list of registered beekeepers is provided on the NJDEP's Beekeeper Notification webpage at <https://www.nj.gov/dep/enforcement/pcp/bpo-bee.htm>. Pesticide applicators are required to notify those beekeepers within a 3-mile radius at least 24 hours prior to the application of any pesticide labeled as toxic to bees. Once notified, it is the responsibility of the beekeeper to take action to protect their hives.

Agricultural applications are exempt from the notification requirements, unless specifically listed under 7:30-9.11 (i); see <https://www.nj.gov/dep/enforcement/pcp/regulations/Subchapter%209.pdf>. Beekeeper notification is mandatory for growers using "bee-toxic" pesticides within three miles of the target site at least 24 hours prior to the date of application on the following crops within the dates stated below or when in the flowering stage (*i.e., both*). "Flowering stage" specifically means when plants bear any portion of a blossom as part of the blooming process associated with pollen and nectar production.

- Apples, pears, strawberries, peaches, and blueberries: April 15<sup>th</sup> to May 15<sup>th</sup>
- Holly: June 1<sup>st</sup> to June 30<sup>th</sup>
- Cranberries: June 15<sup>th</sup> to August 15<sup>th</sup>
- Vine Crops (Cucurbits): June 1<sup>st</sup> to August 31<sup>st</sup>
- Sweet corn (during flowering stage)
- Fields where flowering weeds are present

Notification must include: intended date and approximate time of application; location of the application, brand name and active ingredients of the pesticide to be applied; and the name and license number of the pesticide applicator. Notification to the apiarist can be made in person, by phone, by fax, by email, or regular or certified mail (as long as it is received 24 hours before the application).

### **Pesticide Incident Reporting**

Immediately report pesticide incidents (*e.g., bee kills*) to your State pesticide regulatory agency. Pesticide incidents should also be reported to the National Pesticide Information Center at: [www.npic.orst.edu](http://www.npic.orst.edu) or directly to EPA at: [beekill@epa.gov](mailto:beekill@epa.gov).

## 6.2 Protection of Groundwater

Groundwater is the water contained below our soils. This water is used by 90% of the rural population in the United States as their sole source of drinking water. Contamination of our water supply by pesticides and other pollutants is becoming a serious problem. One source of contamination is agricultural practices. Protection of our groundwater by the agricultural community is essential.

Groundwater collects under our soils in aquifers that are comprised of layers of sand, gravel or fractured bedrock which, by their nature, hold water. This water comes from rainfall, snowfall, etc., that moves down through the soil layers to the aquifer. The depth of the aquifer below the surface depends on many factors. Where it is shallow, we see lakes, ponds and wetlands.

### Factors That Affect Movement of Water and Contaminants

The depth of aquifers, in conjunction with soil types, influences how much surface water reaches the aquifer. Their depth also affects how quickly water and contaminants reach an aquifer. Thus, shallow water tables tend to be more vulnerable to contamination than deeper ones.

This tendency, however, depends on the soil type. Soils with high clay or organic matter content may hold water longer and retard its movement to the aquifer. Conversely, sandy soils allow water to move downward at a fast rate. High levels of clay and/or organic content in soils also provide a large surface area for binding contaminants that can slow their movement into groundwater. Soil texture also influences downward water movement. Finer textured soils have fewer spaces between particles than coarser ones, thus decreasing movement of water and contaminants.

### Chemistry Plays a Role

The characteristics of an individual pesticide affect its ability to reach groundwater. The most important characteristics are solubility in water, adsorption to soils, and persistence in the environment.

Pesticides that are highly soluble in water have a higher potential for contaminating groundwater than those which are less soluble. The water solubility of a chemical indicates how much chemical will dissolve in water and is measured in parts per million (ppm). Those chemicals with a water solubility greater than 30 ppm may create problems. A chemical's ability to adhere to soil particles plays an important role. Chemicals with a high affinity for soil adsorption are less likely to reach the aquifer. Adsorption is also affected by the amount of organic matter in the soil. Soils with high organic matter content are less vulnerable than those with low organic matter content.

Finally, how persistent a chemical is in the environment may affect its ability to reach groundwater. Those which persist for a long time may be more likely to cause contamination than materials which breakdown quickly. Persistence is measured by the time it takes half of a given pesticide to degrade (half-life). Chemicals with an overall estimated half-life longer than 3 weeks pose a threat to groundwater.

### How to Prevent Contamination of Your Ground Water

1. Examine the chemical properties of the pesticides that you use. If you are using materials which persist for long periods of time, are very water soluble, or are not tightly held by the soil, then you may be contaminating your groundwater. You may wish to select another material that has a shorter persistence, lower water solubility or higher potential for soil adsorption. The following table will assist you with these decisions.
2. Determine your local soil and geologic circumstances. If you are in an area with a shallow water table or your soil is low in organic matter or sandy in nature, you have a greater risk of contaminating your groundwater. In these cases, choose a pesticide that has a low water solubility and is not persistent (has a short half-life).
3. Evaluate your management practices. They may be the most important factor in determining your risk of contaminating your groundwater. If you use the same materials year after year, or many times a season, you can increase the potential for contamination due to the amount of pesticide in your soil. The timing of pesticide applications has an effect on groundwater contamination. If you make applications during periods of high rainfall or heavy irrigation, it is more likely that contamination may occur. Also, the water table in the spring may be higher than at other times. Early season applications, therefore, may pose a greater chance for groundwater contamination. Finally, the method of application may have an effect on ground water contamination. Direct injection, incorporation, and chemigation all increase the chance of contamination. If you use these techniques, be sure to follow the procedures listed on the material's label.
4. The location of your wells can be important. If your sprayer loading area or pesticide storage building is too close to your well, the risk of contamination may be greater. Wells used for drinking water or other purposes



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should be at least 50 feet away from pesticide storage buildings and loading areas. In the event of an accident, this distance should prevent contamination. This minimum distance should also be followed for field irrigation wells. If they are too close to application areas, contamination might occur.

5. Check the condition of any wells in the vicinity of sprayer loading areas, pesticide storage areas or field applications. If they have cracked casings you are inviting trouble. Cracks in a well casing provide a direct point of entry for pesticide-contaminated water in the soil around the well.
6. Incorporate an anti-backflow device in any system used for chemigation or to fill your sprayer with water. In the event of a pump shutoff or other failure, if any back-flow into the water system occurs, these devices will prevent pesticides from entering your well. In many states these devices are now required for sprayers by laws.
7. Care and maintenance of your equipment is also an important consideration. If your equipment does not function properly, you may be applying more than is needed and increasing the chance of groundwater contamination. Prior to the season, inspect all of the working parts of your sprayer or chemigation system. Check the pump to see if it is working properly. For both sprayers and chemigation systems, check the water lines for clogs and leaks. For sprayers, check the nozzles for wear and clogs. Clogged, leaking or worn lines and nozzles can cause pesticides to be delivered excessively or in unwanted areas. Be sure to calibrate your equipment. Uncalibrated equipment can cause over delivery as well. You should calibrate your equipment at the beginning of the season, periodically during the remainder of the season and any time you make changes or adjustment to the equipment.
8. Apply materials only when needed. The use of extraneous pesticides can increase the threat of contamination. Check your irrigation practices as well. **Do not** irrigate immediately after a pesticide application, unless required by a pesticide's label. The increased water content in the soil might speed up the movement of a pesticide into ground water. **Remember, you must protect your groundwater.**

**Table D-2.  $K_d$ ,  $K_{oc}$ , Water Solubility and Persistence Values for Selected Pesticides**

Pesticide	Adsorption to Soil $K_d^1$	Adsorption to Organic Matter $K_{oc}^1$	Water Solubility (ppm) <sup>2</sup>	Half Life (days) <sup>3</sup>
atrazine	127	160	33	60
bensulide	--	1,433-4,326	5.6	--
clethodim	0.05-0.23	--	--	3
Dacthal	--	1,500	~7	30
fomesafen	--	60	50	100
glyphosate	324-600	24,000	15,700	47
mesotrione	--	14-390	15,000	~15
methomyl	0.03	28	57,900	8
metribuzin	0.11	60	1,100	30
oxamyl	0.16	1	280,000	7
pendimethalin	--	17,200	0.3	44
S-metolachlor	--	200	488	20
terbacil	0.78	55	710	90

<sup>1</sup>A lower  $K_d$  or  $K_{oc}$  number indicates a greater chance for groundwater contamination. <sup>2</sup>A higher water solubility indicates a greater chance for groundwater contamination. <sup>3</sup>A longer half-life indicates a greater chance for groundwater contamination.

## 6.3 Pesticide Spills

Keep a supply of an absorbent agent on hand to contain liquid spills in the area that you store pesticides, as well as transport pesticide product. Industrial sorbents rated by sorption capacity and type of liquid are commercially available for absorbing the liquids in a cleanup. Use label-prescribed PPE including chemical resistant gloves to clean up spills. Barrier laminate gloves have a broad range of chemical resistance are a good choice to keep in a spill kit. Rubber gloves might break down depending on the pesticide. Let it soak a couple of hours to absorb the spilled pesticide from the floor. This procedure is also recommended for cleaning truck beds that are contaminated.

Specific information concerning pesticide cleanup can be obtained by calling the manufacturer directly or consulting the product Safety Data Sheet (SDS). **The phone numbers for emergencies are listed on every product label.** Information can also be obtained by calling CHEMTREC at 1-800-424-9300, or visiting <http://www.chemtrec.com/>.

**Reporting of Pesticide Spills**

Follow your state spill reporting protocol. Be prepared to report:

1. Date and time
2. Name/address/phone of the pesticide applicator
3. Name /address/phone of the applicator or dealer business, if any
4. Name/phone of the property owner or operator
5. Location of the incident
6. Name and EPA registration number of the pesticide(s)
7. Estimated amount & dilution rate of pesticide(s) involved
8. Corrective action(s) taken

**For Delaware, Maryland, Pennsylvania, Virginia, and West Virginia**, pesticide spills may be reported to the US EPA Region 3 Office (1-800-438-2474).

**In New Jersey**, the licensed dealer, dealer business, commercial pesticide operator, applicator or applicator business, shall *immediately* notify the NJDEP at 1-877-927-6337 of **any reportable pesticide spill** occurring under such person's direct supervision and/or direct observation. "Reportable spills" of pesticides include: 1) Outside a structure – only if more than 1 pound active ingredient; 2) Inside a structure – only if more than 1 pound active of dry pesticides; or 1 gallon of liquid (pesticide &/or diluent); and 3) Indoor spill of termiticide – only if more than 50 in<sup>2</sup> organochlorine termiticide contamination at one injection point; or greater than 1 yd<sup>2</sup> aggregate contaminated by organochlorine termiticide on/at interior wall base; and/or when heating duct/system is contaminated.

Within 10 days of the spill, a written report must be submitted to the NJDEP at Pesticide Control Program, P.O. Box 411, Trenton, NJ 08625-0411 outlining the eight elements listed above. Download a Spill Report Card from the Rutgers NJAES PSEP website at <https://pestmanagement.rutgers.edu/pat/record-forms-2/>.

