

# PESTICIDES

## INTRODUCTION

A pesticide is any substance or mixture of substances that prevents, destroys, repels, or mitigates any pest. A pest is an animal or plant that can injure the environment or the health of populations in that environment. This definition allows any of the following terrestrial or aquatic plant or animal life to be classified as pests: insects, rodents, nematodes, fungi, weeds, viruses, bacteria, or other microorganisms (except those on or within living humans or other animals). The administrator of the Environmental Protection Agency (EPA) determines which organisms qualify as pests.

All those who apply pesticides must consider the potential risks associated with the application of pesticides before using them. The goals of an Integrated Pest Management program are to (a) use pesticides judiciously (after other means of control have been considered) and (b) minimize introducing these toxic chemicals into the environment. Non-chemical pest control measures are given first consideration; chemical controls are initiated only if non-chemical control measures fail, or if the situation dictates that chemical controls are the only option.

Pesticides are unique among toxic materials: to be effective, they must be purposely introduced into the pests' environments. Not only other animals and plants but also humans share this environment with the pests. Excessive residues that result from misapplication and residues that migrate from target areas into areas of environmental concern, such as ground water, are just two of the serious problems associated with pesticide use.

Although the immediate and long-term effects on both the environment and human health may be known, there is still little information on the chronic effects that result from long-term exposures to pesticide residues. Therefore, every precaution and form of protection must be taken whenever pesticides are used.

## THREE PEST CONTROL GOALS

**Prevention:** when the pest's presence or abundance can be predicted in advance, and finally kept from becoming a problem. Control a pest only when it is causing or is expected to cause more harm than is reasonable to accept.

**Suppression:** a common goal with intent to reduce the pest population to a level where the harm it is causing is acceptable. Suppression and prevention are often joint goals because the right combination of control measures can often suppress the pests already present and prevent them from building up again to a level where they are causing unacceptable harm.

**Eradication:** total elimination of the pest population. This is a rare goal in outdoor pest situations. Usually this goal is attempted when a foreign pest has been accidentally introduced but is not yet established in an area. Eradication is commonly used to destroy pests of stored subsistence and wood destroying pests in structures.

## SAFETY CONCERNING PESTICIDE EXPOSURE

With few exceptions, pesticides must be toxic to living organisms to be effective. They are specifically designed to be toxic to those organisms we consider pests (the term pest is an artificial criteria). A substance that is toxic to one species will usually be somewhat harmful to another, including humans.

The words toxicity and hazard are often used interchangeably when describing the toxic effects of a pesticide. However, they are not the same. *Toxicity* is a measure of the capacity of the pesticide to cause injury. It is a property of the chemical itself and its concentration. *Hazard*, on the other hand, is the potential for a chemical to cause injury. It reflects both the toxicity of the pesticide and the likelihood that significant exposure will occur in a particular situation. The other important element is the length of time of the exposure. Pesticide applicators should be aware of the hazards associated with exposure to the chemical and not exclusively with the toxicity of the chemical itself.

Pesticides can cause three types of harmful effects: acute effects, which usually occur within 24 hours of exposure; delayed effects, which may be due to repeated exposure to a pesticide over time; and allergic effects. To cause an adverse effect, a pesticide must enter the body and reach a susceptible site. The three routes through which a pesticide can enter the human body are: skin (by contact to include the eyes), lungs (by inhalation), and the mouth (by ingestion).

- 1. Skin or Dermal Exposure.** In most pesticide handling situations, the skin is the part of the body that is most likely to receive exposure. Dermal absorption may occur from spilling pesticides on unprotected skin, by drift while mixing or applying pesticides, by not washing hands after handling pesticides or their containers, or by wearing pesticide-contaminated clothing. The amount of pesticide absorbed depends on the formulation of the pesticide and the part of your body affected. In general, wettable powders, dusts and granular pesticides are not as readily absorbed as are oil-based liquid formulations such as emulsifiable concentrates. The genital area and the scalp are highly absorptive, while skin covering the hands is more resistant to absorption. Cuts, abrasions, and rashes enhance absorption in all parts of the body. Under certain conditions and with certain pesticides, absorption through the eyes can be significant and particularly hazardous. Avoid this type of exposure by wearing protective eye covering and chemical resistant gloves and clothing, especially when indicated on the label.
- 2. Inhalation Exposure.** Protecting the lungs is especially important since pesticide powders, dusts, gases, vapors, or very small spray droplets can be inhaled during mixing, loading, or application, especially in confined areas. Once inhaled into the lungs, pesticides can enter the blood stream. If inhaled in sufficient amounts pesticides can cause damage to nose, throat, and lung tissue. The label will indicate the need for a face mask or respirator when using specific pesticides.
- 3. Oral Exposure.** Most accidental oral exposure occurs when pesticides are transferred from their original labeled container and put into an unlabeled container (this is in direct violation of the law). Oral exposure may also occur when liquid concentrations splash

into the mouth during mixing, when cleaning equipment, or by not washing hands before eating, drinking, smoking or chewing. Do NOT eat, drink, chew gum or tobacco or smoke when applying pesticides.

### ACUTE TOXICITY VALUES FOR PESTICIDES

Category of Toxicity	Label signal word	LD 50 Oral mg/kg	LD 50 Dermal mg/kg	LC 50 Inhalation mg/l <sup>3</sup>	Approximate Lethal Oral Dose (150 lb person)
I Highly Toxic	DANGER POISON	0-50	0-200	0-0.2	A few drops to a teaspoon
II Moderately Toxic	WARNING	50-500	200-2,000	0.2- 2	1 teaspoon to 1 ounce
III Slightly Toxic	CAUTION	500-5,000	2,000-20,000	2.0-20	1 ounce to 1 pint
IV Relatively Non-toxic	CAUTION	>5,000	>20,000	>20	More than 1 pint

LD 50 is the median lethal dose required to kill 50% of a test population, expressed in milligrams of toxic substance per kilogram of body mass of test animal (mg/kg = ppm = parts per million).

LC 50 is the median lethal concentration in air or water that kills 50% of a test population in a given time, expressed in milligrams per cubic liter (mg/l<sup>3</sup>).

**Symptoms of Acute Pesticide Poisoning:** The symptoms most commonly reported, which often appear in progression and depend, in part, on whether the chemical was touched, inhaled, or ingested, are:

1. Mild symptoms: headache, dizziness, weakness, anxiety, tremors of tongue and eyelids, blurred vision.
2. Moderate symptoms: nausea, salivation, tearing, abdominal cramps, vomiting, sweating, and muscular twitching.
3. Severe symptoms: diarrhea, pinpoint eye pupils, breathing difficulty, blue color to lips and finger tips, loss of bladder control, convulsions and coma.

Note: pesticide poisoning symptoms often resemble those for heat prostration, smoke inhalation and the flu. In general, it should be emphasized that medical attention should be obtained if any feeling of discomfort or illness or unusual appearance occurs. Remain alert to symptoms of pesticide poisoning because the symptoms may be delayed up to 12 hours after exposure.

## **FIRST AID FOR PESTICIDE POISONING**

**General First Aid Guidelines.** The best first aid in pesticide emergencies is to stop the source of pesticide exposure as quickly as possible. First aid is the initial effort to help a victim while medical help is on the way. If you are alone with the victim, make sure the victim is breathing and is not being further exposed to the pesticide before you call for emergency help. Apply artificial respiration if the victim is not breathing. Do not become exposed to the pesticide yourself while you are trying to help. Treat for shock by keeping the victim flat, keeping him warm, and reassuring him until the arrival of medical help.

**In an emergency, look at the pesticide labeling, if possible. If it gives specific first aid instructions, follow those instructions carefully. Take the pesticide container or the label to the physician.**

### **First Aid for Pesticide on Skin:**

1. Drench skin and clothing with plenty of water. Any source of relatively clean water will do (a ditch or pond, for example).
2. Remove personal protective equipment and contaminated clothing.
3. Wash skin and hair with mild detergent and water.
4. Dry victim and wrap in blanket; do not allow victim to become chilled or overheated.

### **First Aid for Pesticide in Eye:**

1. Wash eye quickly but gently.
2. Use an eyewash dispenser, if available. Otherwise, hold eyelids open and wash with a gentle stream of clean running water positioned so that it flows across the eye rather than directly into the eye.
3. Continue washing for 15 minutes or more.
4. Do not use chemicals or drugs in wash water. They may increase the extent of injury.

### **First Aid for Swallowed Pesticide:**

1. Rinse mouth with plenty of water.
2. Give victim large amounts (up to 1 quart) of milk or water to drink.
3. Induce vomiting only if instructions to do so are on the labeling.
4. Do not induce vomiting if:
  - a. The victim is in a coma or unconscious.
  - b. The victim is in convulsions.
  - c. The victim has swallowed petroleum products.
  - d. The victim swallowed a corrosive poison (strong acid or alkaline products) – symptoms: severe pain, burning sensation in the mouth and throat.
5. Induce vomiting by:
  - a. Position victim face down or kneeling forward. Do not let the victim lie on his back.
  - b. Put finger or the blunt end of a spoon at the back of victim's throat or give syrup of ipecac.

### **First Aid for Inhaled Pesticide:**

1. If the victim is in an enclosed space, do not go in after him without a proper respirator. When the poison is unknown, use only air-supplied respirators.
2. Carry the victim (do not let him walk) to fresh air immediately.
3. Open all doors and windows, if any.
4. Loosen all tight clothing.
5. Apply artificial respiration if breathing has stopped or is irregular.

### **PESTICIDE FORMULATIONS**

The component of a pesticide that controls the target pest is called the active ingredient (a.i.). Before a pesticide product is sold, active ingredients are mixed with liquid or dry inert ingredients (non-pesticidal). Although inert ingredients do not kill the pest, they may be capable of adverse environmental and human health effects. (Some inert ingredients contain petroleum distillates). Mixtures of active and inert ingredients are pesticide formulations. Formulations make an active ingredient: more convenient to handle; safer, easier, and more accurate to apply; and in some cases, more attractive to the pest.

It is important to choose the formulation that is best for a particular job based on its effectiveness, cost, practicality, and relative safety to the applicator and the environment. There are various types of formulations: liquids, dry formulations (including baits), and fumigants. Some of the following considerations which are important in choosing a formulation are: some formulations require constant spray tank agitation, while others do not; dusts and granules do not require water for application, but it is often difficult to accurately calibrate the equipment and achieve uniform distribution; potential hazards to the applicator and potential for drift and environmental contamination vary among formulations; formulations sold as liquids are easier to measure in the field than dry ones; dry formulations are less affected by subfreezing temperatures during storage than liquid formulations. Only the more commonly used pesticide formulations are discussed below.

### **DRY FORMULATIONS**

1. **Dusts (D).** Most dust formulations consist of 1 to 10 percent of the active ingredient (technical grade pesticide) mixed with an inert material such as talc, clay, powdered nut hulls, or volcanic ash. All ingredients are finely ground to a fairly uniform particle size range. Adjuvants are often added so that the formulation will store well and handle properly. Dusts are always used dry and should never be mixed with water. Because of the nature of very fine particle size dusts are subject to drift into non-target areas during application. Always apply them carefully, and never apply them under windy conditions. Dusts are used in structural pest control (applied to cracks and crevices), flea control, and as tracking powders for rodent control. Dusts are no longer used for mosquito control.
2. **Wettable Powders (WP or W).** A wettable powder is a dry, powdered pesticide formulation that looks like dust. But, unlike dusts, they contain wetting and dispersing

agents. WPs are usually much more concentrated than dusts, containing 15 to 95 percent active ingredient. They are made to mix with water, and when mixed, form a suspension. Continual agitation is needed in the spray tank to keep the formulation in suspension since it does not form a true solution. Some formulations of *Bti* are available as a wettable powder.

3. **Granules (G), Pellets (P or PS) and Briquets.** Granular formulations are similar to dust formulations except that granular particles are larger and heavier. The coarse particles are made from an absorptive material such as clay, corncobs or walnut shells. The active ingredient either coats the outside of the granules or is absorbed into them. The amount of active ingredient is relatively low, usually ranging from 1 to 15 percent. Pellet formulations are very similar to granular formulations, except the particles are uniform in weight and shape. Briquets are donut-shaped carriers designed to release effective levels of insecticide for 30 days or more. Larvicides containing *Bti*, *Bacillus sphaericus*, methoprene and temephos are available in these formulations.
4. **Water-Dispersible Granules (WDG).** Water-dispersible granules are like wettable powder formulations, except the active ingredient is prepared as granule-sized particles. Water-dispersible granules must be mixed with water to be applied. Once in water, the granules break apart into fine powder. Like WPs, the formulation requires constant agitation to keep it suspended in water. Water-dispersible granules cause less inhalation hazard to the applicator during pouring and mixing than WPs. One *Bacillus sphaericus* product is available as a WDG.
5. **Baits (B).** A bait formulation is an active ingredient mixed with food or another attractive substance. The bait either attracts the pests or is placed where the pests will find it. Pests are killed by eating the pesticide the bait contains. Baits for public health pest control are used to control cockroaches, flies and rodents. Baits can be attractive to children and pets and may kill domestic animals and non-target wildlife if not properly used.

## LIQUID FORMULATIONS

1. **Solutions (S).** Some pesticide active ingredients dissolve readily in a liquid solvent, such as water or a petroleum-based solvent. When mixed with the solvent, they form a solution that will not settle out or separate. If properly prepared for special uses, solutions do not leave unsightly residues and will not clog spray equipment. Solutions are rapidly absorbed through the insect cuticle, but a disadvantage is that they are also readily absorbed through human skin. Solvents such as diesel oil, kerosene, or mineral oil can be costly and a fire risk; cause damage to asphalt, rubber, plastic, tile floor, and some paints; and are quickly absorbed by porous surfaces, making it less available to walking insects. Some *Bti* products are available as aqueous solutions.
2. **Emulsifiable Concentrates (EC or E) and Emulsions.** These are concentrated oil solutions of technical grade material with enough emulsifier added to make the concentrate mix readily with water for spraying. The emulsifier is a detergent-like material that makes possible the suspension of microscopically small oil droplets in water

to form an emulsion. When an emulsifiable concentrate is added to water, the emulsifier causes the oil to disperse immediately and uniformly throughout the water, if agitated, giving it an opaque or milky appearance. The advantages are: high concentration means price per pound of active ingredient is relatively low, and the product is easy to handle, transport and, store; non abrasive, thus less wear and tear on equipment; if properly formulated should remain suspended without further agitation for several days after dilution with water; little visible residual on finished surfaces. The disadvantages are: high concentration makes it easy to overdose or under dose through mixing or calibration error; toxic to plants; easily absorbed through the skin; solvents may cause rubber or plastic hoses, gaskets, pump parts, and surfaces to deteriorate; may cause pitting or discoloration of painted surfaces and may stain carpets, and may be corrosive.

- 3. Ultra-Low-Volume (ULV).** These concentrates may approach 100 percent active ingredient. They are designed to be used as is, or to be diluted with only small quantities of specified solvents. Most mosquito adulticides are ULV formulations. The advantages are they are relatively easy to handle, transport and store; little agitation is required; not abrasive to equipment; no plugging of screens and nozzles; and they leave little visible residue on treated surfaces. The disadvantages are they have a high drift hazard; specialized fogging equipment is required; they are easily absorbed through the skin; and solvents may cause equipment parts to deteriorate.

## **ADJUVANTS AND SYNERGISTS**

An adjuvant is a chemical added to a pesticide principally to increase its effectiveness, although some adjuvants are designed to reduce phytotoxicity (plant injury) or drift. Most pesticide formulations already contain a small percentage of adjuvants. Wetting agents and emulsifiers are often added so that the pesticide will mix with water or coat treated surfaces more effectively. Spreaders allow the pesticides to spread evenly over treated surfaces. Stickers increase the adherence of the chemical to the treated surface, increasing its persistence, particularly under adverse weather conditions. Adjuvants should normally be added only if recommended on the product label. Some labels expressly prohibit the use of adjuvants.

Synergists are chemicals that lack pesticidal effects of their own but enhance the pesticidal properties of other chemicals. Piperonyl butoxide is a synergist that is added to many mosquito adulticides. It inhibits the breakdown of pesticides by insects. The addition of piperonyl butoxide to a pesticide reduces the amount of pesticide required to be effective.

## **COMPATIBILITY OF PESTICIDES**

In some situations, applicators may attempt to control more than one pest with a single application by combining pesticides in the spray tank. Such a practice can create problems. Sometimes these problems are serious and more costly than if the chemicals are applied alone. Product mixing requires extensive knowledge of pesticide formulations, timing of application, and application technique.

Before combining any pesticides, check labels, product information sheets, company representatives, or New Mexico Department of Agriculture personnel for information on compatibility of the products in question.

## **STORAGE OF PESTICIDES**

Note: refer to Title 40 Code of Federal Regulations, Part 165 (40CFR165) and the Federal Insecticide, Fungicide, and, Rodenticide Act for complete design criteria of pesticide storage areas. This section identifies important points in the storage of pesticides.

- A. Isolation of Storage Area.** The facility used for pesticide storage should be isolated from other buildings, barns or any other area in which a fire might start and spread to the pesticide storage area. The storage area should be a minimum of 200 feet from surface water, existing wells, and cisterns. In addition site facilities should be downhill from sensitive areas as stated above. The facility should not be located on or above a 100-year flood plain. Facilities should not be located over aquifers unless the aquifer is adequately protected through containment measures. Runoff from firefighting must not reach ponds, lakes, streams, or rivers. The storage should be placed in an open, well-lighted area easily accessible to police, emergency medical services, and the fire department.
- B. Indoor Storage.** Pesticides shall be stored in an area sealed or separated from clean areas, with direct access to the exterior. All pesticides stored indoors shall be off the floor so that all labels are visible, with lanes to provide effective access and inspection, and stored no more than eight feet high. Pesticides shall be stored in a dry room or building where temperatures above 50F and below 100F are maintained. Pesticide storage shall be separated from mixing areas, shower and locker room, offices, or any area where personnel work for prolonged periods. Pesticide concentrates shall not be stored in rooms containing a floor drain of any type; containment by curbing or sloped floors is required in pesticide mixing and storage areas. Do NOT install floor drains in the interior pesticide storage area. Nonabsorptive shelving is to be used for pesticides. Insecticides shall be separated from herbicides due to the potential for contamination of the insecticides with herbicides. Also liquid materials should be stored below dry materials to prevent contamination if leaks or spills occur. Ammonium nitrates fertilizers shall not be stored in the same structure as pesticides for fire safety purposes.
- C. Security.** The storage area should have internally secured openings except for doors. Exterior doors shall be self-locking and self closing and shall be secured by lock and key with at least one key available on the premises at all times in case of fire or other disaster which would necessitate entry to the area. Windows are to have interior bars or heavy gage mesh if the facility is not enclosed by a climb resistant chain link fence (minimum of 7 ft high, without top rail). Security gates are required and are to be kept locked. As an alternative, do not provide windows. Exterior lighting should be used to illuminate all areas within the fenced area. Particular attention should be given to illuminate any dark spots or shadows, especially where there are doors or windows. Even though the intentional use of concentrated pesticides to cause illness or death is considered to be a “low probability, high impact” event, it must be seriously considered as part of overall

pesticide security. Pesticides may be applied, against their intended use, to the air people breathe; may adulterate food and water, or may contaminate surfaces or objects that people contact. Pesticides are a potential terrorist tool and in some cases could be delivered to an unsuspecting population through delivery systems used in normal pest management operations. Pesticide sprayers can be used to disperse biological agents as well as pesticides. Pesticides and pest application equipment must be properly stored and safeguarded.

- D. Ventilation.** A separate ventilation system shall be provided with roof mounted centrifugal fan selected for six air changes per hour as a minimum. Locate the exhaust stack and supply air intakes far enough apart to prevent recirculation of contaminated air. Proper ventilation should include louvers near ground and ceiling levels. This lowers levels of pesticide air contaminants in the building and will keep temperatures lower in the summer. If storing volatile pesticides such as malathion, a forced air fan is strongly recommended.
- E. Lighting.** Indoor lighting shall be 50 foot-candles (538 lux) in the office and mixing rooms and pesticide storage areas, and 20 foot-candles (215 lux) in the washroom. Outdoor lighting should be provided when dawn or dusk operations are performed.
- F. Construction.** Exterior walls shall be constructed of metal, concrete, or masonry materials. Porous surface finishes shall not be used in pesticide areas. Interior floors and walls in pesticide areas should be non-absorbent and easily cleanable.
- G. Identification of building.** A sign in English and Spanish denoting “Pesticide Storage Area” and signs such as “Danger” and “Poison” must be present on or near the door and on the building and fences to protect persons who may not be familiar with the hazardous nature of the area in case of fire. A sign that reads “No Smoking” is to be placed in the pesticide area. A list of the types of materials stored shall be posted on the outside of the storage area and a copy should be given to the on-scene hazardous waste coordinator and the local fire department. The list shall include “chemical names and formulations” rather than the generic “brand” names.
- H. Summary.** Proper storage of pesticides will help protect people, animals and the environment from undue exposure. If fewer pesticides are kept on hand, fewer storage problems will be encountered. If all pesticides are stored as if they are highly toxic, the chance of a highly toxic pesticide being improperly stored is greatly lessened. Pesticide storage areas shall not be used for hazardous waste storage unless specifically designed to accommodate hazardous waste materials since other federal regulations apply to hazardous waste facilities.

## **TRANSPORT OF PESTICIDES**

If you ship or transport fertilizers, pesticides, gasoline, diesel fuel, or propane in packages or containers that are larger than 119 gallons, or the total quantity you ship or transport at any one time is more than 1,000 pounds, U.S. Department of Transportation regulations require you to

have a security plan. If you do not ship or transport in the amounts listed above, then you DO NOT need a security plan. If the security plan applies you must include measures to address personnel security, unauthorized access, and en route transportation issues as applicable. For further information, contact the Hazardous Materials Information Center at 1-800-HMR-4922 or visit their website at <http://hazmat.dot.gov>.

- A. Before transporting, check the pesticide containers to ensure all containers are closed and secure. Look for possible cracks, leaks or tears in the containers. If containers are packed in a box, remove and check the bottom of the carton for spotting, indicating leakage.
- B. Put pesticide containers in back of the truck and fasten securely — never transport pesticides in the passenger area or trunk of car. All pesticides must be stored in locked containers affixed to the vehicle. Never leave the truck unsecured.
- C. Never transport pesticides with food, feed or other consumer items.
- D. Do not toss or drop containers; do not slide containers over rough surfaces that might rip bags or puncture rigid containers.
- E. Upon reaching destination, check carefully for any possible damage to containers and for leakage that may have occurred during transport. (See Decontamination and Cleanup of Spills).
- F. If, upon reaching destination, all pesticide containers appear to be in good condition, immediately unload to a locked storage area.

## USE OF PESTICIDES

### A. Before application:

1. It is important to select the correct pesticide and formulation. Use pesticides only when you are sure they are needed. The aim of pesticide application is to distribute the minimum effective amount of active ingredient to the target pest with the minimal contamination of non-target organisms. Consideration must be given whether there are conditions in the treatment site environment that may cause the pesticide to move off site. **When applying pesticides do not work alone.**
2. The first action to be taken before purchasing, mixing, or applying any pesticide is to **READ THE LABEL**. Labels are legal documents providing directions on how to mix, apply, store, and dispose of a pesticide product. The content areas of the label are: ingredient statement; statement of use; type of pesticide; net contents; manufacturer name and address; EPA registration numbers; EPA establishment numbers; signal words and symbols; precautionary statements; statement of practical treatment in case of poisoning; environmental hazards; physical or chemical hazards; reentry statement; directions for product storage and disposal. The most important points on the label to consider are:

- a. The relative toxicity of the pesticide indicated by the words "DANGER-POISON", "DANGER/PELIGRO", "WARNING/AVISO", or "CAUTION".
  - b. What to do in case of emergency and the antidote (if there is one).
  - c. Uses for which the pesticide is registered. The use directions and instructions are not advice; they are requirements. Note the following statement on every pesticide product label "It is a violation of Federal law to use this product in a manner inconsistent with its labeling". A pesticide may be used only on the plants, animals, or sites named in the directions for use. You may not use higher dosages, higher concentrations, or more frequent applications. You must follow all directions for use, including directions concerning safety, mixing, diluting, storage, and disposal.
  - d. The amount of active ingredient in this particular formulation. The ingredient statement must list the official chemical and common names of active ingredients.
  - e. The application rate and method of application. The Federal law does allow you to use pesticides in some ways not specifically mentioned in the label. You may apply a pesticide at any dosage, concentration, or frequency less than that listed on the label. Apply a pesticide against any target pest not listed on the label if the application is to a plant, animal, or site that is listed. Use any appropriate equipment or method of application that is not prohibited by the label.
  - f. Whether or not protective clothing is required. Pesticide labels vary in the type of protective clothing and equipment statements they contain. Many labels carry no statements at all. The best way to determine the correct type of protective clothing and equipment is to consider the signal word, the route of entry statements, and the specific action statements on the label.
  - g. How to dispose of "empty" containers. Many times the instructions for how to dispose of excess pesticide and the pesticide container are general in nature and are not specific as state and local laws vary.
3. Prepare pesticide mixtures away from houses, livestock, wells or surface water sources. Review the label before opening the container so that you are familiar with current mixing and loading procedures.
  4. When so directed by the label, wear adequate protective clothing and equipment and follow all instructions. Put them on before handling or opening a pesticide container. Remember that a respirator and an appropriate form of eye protection should be worn if there is any chance of pesticide inhalation or eye exposure. Highly toxic pesticides exhibit skull and crossbones and the word "POISON" in red on the label. These pesticides should never be used without proper protective clothing and equipment as follows:
    - a. Lightweight impermeable suit with full-length sleeves and legs, kept closed at the neck and wrists; the suit is to be worn outside of the boots and over the gloves to prevent pesticide from running down into the glove or boot in case of a spill on the suit.
    - b. A wide-brimmed hat or hood of lightweight impermeable material.
    - c. Impermeable gloves and boots; there should be no absorbent lining in the gloves or boots.

- d. Respirator covering nose, mouth and chin or one covering the full face; use the correct respirator and cartridge for the intended job and only those approved by the U.S. Bureau of Mines and NIOSH. Respirators must be fitted to the individual; facial hair may prevent a good seal. A positive and negative pressure test should be conducted each time a respirator mask is used. This is the only way to ensure it is properly fitted and working correctly.
  - e. Goggles unless full-face mask is worn. Goggles should not have vents on the top, as this will allow pesticide into the face in the event of an accident or heavy drift.
  - f. All the above should be cleaned with soap and water and stored away from contamination after each day's use. The chemical cartridge on the facemask must be removed before washing the mask. Boots and gloves should be washed inside as well as outside.
  - g. Follow manufacturer's recommendations for cartridge life. Replace canisters/cartridges when you: smell organic vapors; experience increased breathing resistance; exceed the canister/cartridge termination date; or after approximately 8 hours of work use. All respirators shall be routinely inspected before and after each use.
5. Check sprayers before each use to make sure hose connections are tight and the valves do not leak. Never use your mouth to blow out a clogged spray nozzle. Remove the nozzle and clean it in soapy water, using a fine wire to probe the opening and remove the clog.
  6. If a hose is used to dilute a pesticide concentrate before use, take precautions so that back-siphonage from the pesticide to the water source is not possible. Do not place the end of the hose into the pesticide or its container. Never use your mouth to start a siphon!
  7. Keep the pesticide in its original container. If a pesticide container is damaged, transfer the product to a similar, undamaged container. Then place the pesticide label on the new container. Never put a pesticide into a food container, or container designated for water!
  8. After working with pesticides, never smoke, eat or drink without first washing your hands with soap and water.
  9. When mixing or using flammable pesticides, do not smoke; avoid defective wiring and open flames.
  10. Double-check arithmetic before diluting concentrate. Make sure containers used for measuring the pesticide concentrate and final mixture are accurate.
  11. Mix only what is needed for one day's work.
  12. Have at least five (5) gallons of clean water available that can be used as a drench in case of skin contact with pesticide. Most cases of pesticide poisoning are through skin contact. Have soap available also.
  13. Spills are probably most likely to occur in the area where the pesticides are mixed and/or loaded into application apparatus. If a spill should occur on the ground, place the contaminated soil into a leak-proof container for disposal (see following section).
  14. REMEMBER: READ THE LABEL AND FOLLOW THE DIRECTIONS CAREFULLY!!

**B. During Application:** The aim of pesticide application is to distribute the minimum effective amount of active ingredient to the target pest with the minimal contamination of non-target organisms.

1. Be aware of sensitive areas. Applications in areas where people, especially children or the sick, live, work, or are cared for; areas where food or feed is processed, prepared, stored, or served; areas where domestic or confined animals live, eat, or are cared for; or areas with ornamental or other sensitive plantings are maintained should be performed by personnel who are well trained about how to avoid causing non-target, personal, or environmental injury. Care must be used in areas near surface water, near schools, playgrounds, hospitals, areas near habitats of endangered species, areas near apiaries, wildlife refuges, or parks.
2. Do not spray people, pets or other non-target species.
3. Do not spray into the wind.
4. Do not smoke, eat or drink.
5. If you begin to feel abnormal in any way, immediately stop working; call a physician and report which pesticides are being used.
6. In an emergency, you may also call the **NM Poison Control Center at 1-800-222-1222**.

## **PESTICIDE SPILLS AND CONTAINMENT**

Most pesticide spills occur in areas such as loading docks, warehouses, and mixing areas. The best means by which a spill can be reduced or prevented is to take precautionary measures such as providing adequate storage facilities for all pesticide chemicals, conducting monthly inspection of these facilities, and ensuring that emergency equipment is on hand for spill cleanup. When a pesticide spill occurs, specific procedures should be followed:

1. **Identification of the pesticide involved in the spill incident.** Information such as formulation, percent active ingredient, and manufacturer's name and address should be obtained.
2. **Safety and first aid.** All persons working with pesticides should be well trained in basic first aid and evacuation procedures. First aid kits should be maintained at pest control shops and storage areas and carried on pest control vehicles. In addition the telephone numbers of the local hospital and poison control center should be posted in a visible location and carried by pest control personnel while on the job.
3. **Care of injured.** The first concern is to minimize contamination of personnel. Eliminate all sources of ignition to prevent the threat of fire or explosion. Don necessary protective equipment and remove victims to a safe location upwind from the spill. If the spill occurred in an enclosed area, open all doors and windows to enhance ventilation of the area. Obtain medical assistance; do not leave injured or incapacitated persons alone.
4. **Site security.** To prevent others from entering the area, rope off the spill area and post warning signs.
5. **Containment and Control.** The spilled pesticides must be contained at the original site of the spill. The pesticide must be prevented from entering storm drains, wells, water systems, and waterways by the following procedures: Don protective equipment; prevent

further leakage by repositioning the pesticide container; prevent spreading by trenching or encircling the area with a sand snake, absorbent material, or, as a last resort, soil or rags; cover the spill; if liquid use an absorbent material, if dry material use polyethylene or plastic tarpaulin and secure. Use absorbent materials sparingly as they may also be disposed of as hazardous wastes.

- 6. Pesticide Spill Reporting.** In case of spill, call the **State Radio Communications Switchboard** via the 24 hour emergency reporting number: **505-827-9329**. Have the following information available: the name of the pesticide and amount spilled; the percentage of active ingredients, including carriers and/ or diluents; and the formulation of the pesticide, i.e. dust, emulsifiable concentrate, wettable powder, etc.

## **CLEANUP OF SPILLS**

Note: another source of information about pesticides and spills is CHEMTREC at 1-800-262-8200.

Adequate cleanup of spilled pesticides is essential in order to remove any health or environmental hazards. When cleaning up pesticide spills, it is advisable **NOT TO WORK ALONE** and to make sure the area is properly vented. In case of any spill, wear protective gear and clothing in accordance with directions on the pesticide label for the pesticide being cleaned up. Spill kits are commercially available and should be placed where spills are most likely to occur. Read and become familiar with label directions for clean up of spills **BEFORE** using any pesticide.

1. Dry spills should be carefully handled to prevent spreading any dust or powder. The material should also be placed into a leak-proof container for disposal. While sweeping and moving the material, keep the dry pesticide from becoming airborne. After the pesticide has been placed in a leak-proof container, properly secure and label the container, identifying the pesticide and possible hazards. Note: a heavy-duty plastic bag may be used in place of a container.
2. Liquid spills should be covered with an absorbent material (clay cat litter) and placed into a leak-proof container for disposal. After the pesticides has been placed in a leak-proof container properly secure and label the container, identifying the pesticide and possible hazards.
3. Contaminated soil should be removed to a depth of at least three inches below the wet surface line and placed in properly labeled leak proof drums for disposal.

## **DECONTAMINATION**

Decontamination solutions can be used for decontaminating surfaces and materials where pesticide spills have occurred. However, the bulk of the spilled pesticide should be cleaned up or removed prior to applying the decontaminate. After cleaning up the bulk material, apply the appropriate decontamination solution and allow one to six hours' reaction time before using an absorbent material.

Depending on the location of the spill and pesticide spilled, chlorine bleach, caustic soda (lye, sodium hydroxide), or lime can be used to effectively decontaminate most spill areas. Many pesticides, especially the organophosphate group, decompose when treated with lye or lime. Fewer

pesticides are decomposed by bleach (sodium hypochlorite). Decontaminants should be applied in amounts no greater than specified in the following table:

<b>Percent Active Ingredient in Pesticide</b>	<b>Amount of Decontaminant Needed</b>
1-10	Equal to quantity of pesticide spilled
11-79	Equal to 1.5 times quantity of pesticide spilled
80-100	Twice the quantity of spilled pesticide

1. Dry decontaminants should be spread thinly and evenly over the spill area. Then, using a watering can, lightly sprinkle the area with water to activate the decontaminant.
2. Liquid decontaminants should be premixed and applied with a watering can to the spill area.
3. Clean all equipment used for spill cleanup with detergent and appropriate decontaminants. Collect all spent decontaminants and rinse water and place them in labeled leak-proof containers. Clothing and gloves that cannot be decontaminated must be placed in leak-proof containers for proper disposal.
4. Decontamination of contaminated equipment can be done by soaking the equipment in a pail filled with the decontamination solution or using a scrub brush. All tools and surfaces must be thoroughly rinsed with sparing amounts of clean water. All rinse water and spent decontamination solution should be collected in drip pans or other suitable containers and transferred to a properly labeled leak-proof drum for disposal.
5. Some chemicals may be regulated as a hazardous waste by the New Mexico Environment Department or the U.S. Environmental Protection Agency.

**Guidelines for applying decontaminants:**

1. DO NOT store in close proximity to, or mix chlorine bleach with, ammonia-containing pesticides.
2. DO NOT use calcium hypochlorite as a decontaminating agent because of the fire hazard.
3. DO NOT use lye on aluminum surfaces.
4. When performing decontamination:
  - a. Wear unventilated goggles when working with caustic soda (lye) to protect your eyes from severe damage.
  - b. Wear an approved respirator.
  - c. Wear protective clothing and impermeable gloves.

**DISPOSAL OF PESTICIDES AND CONTAINERS**

1. All disposal of pesticides and containers must be done in accordance with label requirements, the New Mexico Pesticide Control Act and the New Mexico Hazardous Waste Management Regulations. All contaminated materials, including cloth, soil, wood, etc., that cannot be effectively decontaminated as described must be removed and placed in a sealed leak-proof drum. All drums must be properly labeled and disposed of in a hazardous waste disposal facility under current EPA or state permit.
2. Pesticides are best disposed of by using them for the purpose intended. Therefore, mix only enough for your immediate needs in order to minimize disposal problems.

3. When purchasing pesticides, ask the distributor if the empty containers may be returned for recycling.
4. All containers should be triple-rinsed and the rinsate poured back into the application machine to be used in the normal course of operation.
5. Containers that have been triple-rinsed and punctured are not considered hazardous waste. However, they should be kept in locked storage until disposed of permanently. NEVER re-use empty pesticide containers for ANY PURPOSE.
6. DO NOT BURN pesticide bags. The smoke may be poisonous.
7. For further information (non-emergencies), contact the **Hazardous Waste Bureau of the New Mexico Environment Department** in Santa Fe at **505-476-6000** OR the **Pesticide Compliance Program of the New Mexico Department of Agriculture** in Las Cruces at **800-432-5310** (locally 575-646-2133).

### **FOR FURTHER INFORMATION:**

National Pesticide Applicator Certification Core Manual, National Association of State Departments of Agriculture Research Foundation. Available at:  
<http://www.nasda.org/workersafety/>

National Pesticide Information Center, a cooperative effort of Oregon State University and the U.S. Environmental Protection Agency. Available at: <http://npic.orst.edu/>

New Mexico Pesticide Control Act and Regulations, New Mexico Department of Agriculture. Available at: <http://www.nmda.nmsu.edu/laws-statues/Pesticides.html>

Federal Insecticide, Fungicide and Rodenticide Act, U.S. Environmental Protection Agency. Available at: <http://www.epa.gov/lawsregs/laws/fifra.html>

New Mexico Hazardous Waste Management Regulations, New Mexico Environment Department. Available at: <http://www.nmenv.state.nm.us/hwb/stareg.html>

## GUIDES FOR LAUNDERING CLOTHES SOILED WITH PESTICIDE

### 1. What are pesticides?

Any chemicals used to destroy, prevent or control pests. Fungicides, herbicides, insecticides and rodenticides are all kinds of pesticides. They are:

- Used by agricultural workers in fields, orchards, etc.
- Used by homeowners for yard, garden and in the home.
- Used by state and county industrial weed control management personnel.

### 2. What do we need to know about the pesticide to help us make decisions about handling pesticide-contaminated clothing in laundry?

The person who will be laundering contaminated clothing needs to know the toxicity level of the pesticide used. Use the key words on pesticide container label as a guide:

Key Word	Toxicity
DANGER-POISON	Highly toxic/concentrated
WARNING	Moderately toxic
CAUTION	Low to very low toxicity

- Apparel contaminated with **highly toxic** and **concentrated** pesticides must be handled carefully. Clothing (other than rubber and neoprene gloves and unlined boots) **completely saturated with liquid concentrated pesticides** should be **discarded per label directions on the pesticide**.
- Clothing contaminated by moderately toxic pesticides does not require such drastic measures.
- Hazards of handling clothing contaminated with low toxicity pesticides are less pronounced.

### 3. Does the toxicity level determine the ease of pesticide removal?

No, the formulation of the pesticide determines the ease of removal in laundering of contaminated clothing. Researchers have found that:

- Pesticides that are more soluble in water may be easier to remove in laundering.
- Clothing contaminated with undiluted emulsifiable concentrate still contained a large amount of pesticide even after **ten** washings.
- Some pesticide contamination may be more difficult to remove from heavyweight than lightweight fabrics; this suggests the need for washing clothing made from heavier fabric (i.e., denim) more than once.

### 4. Are there other suggestions for safe and successful removal of pesticide-soiled laundry?

Put pesticide- soiled clothing in a disposable container, such as a box lined with a plastic garbage bag, until time for laundering. Wear rubber or neoprene gloves to handle pesticide-soiled clothing. Wash clothing as soon as possible after soiling. Research results indicate that more pesticide was removed when garments were washed immediately than when allowed to dry 24

hours or longer. If granular pesticides have been used, shake garments outdoors to remove any granules that may be clinging to the garment.

**Pre-rinse with one of the following methods:**

- Soak garments in a tub or bucket. Do not throw the soaking water on lawn or garden.
- Spray or hose water on garments as they hang on a line outdoors.
- Pre-rinse with agitation in an automatic washing machine. Wash pesticide-contaminated clothes separately from family wash.

**Other suggestions:**

- Pesticides can be transferred from one garment to another in the wash water.
- It is strongly recommended that multiple washings be used for heavily contaminated clothing.
- Discard clothing contaminated with concentrated pesticides. Clothing soiled with dilute solutions of slightly toxic pesticides may be effectively laundered in one machine washing.
- Use hot water (140°F) or warm water for laundering. Cold water temperatures are relatively ineffective in removing pesticides from clothing.
- **Wash only a few items at a time**, but **use the full water level**. If your washer has a sudsaver, do not use it when washing pesticide-soiled clothing.
- Use a heavy duty laundry detergent (granular or liquid). For removal of emulsifiable concentrate pesticide formulations, researchers have found that heavy duty liquid detergents are more effective than other detergents.
- Use the normal or regular (12-14 minute) wash cycle and two rinses, if possible.
- Laundry additives, such as bleach or ammonia, do not contribute to the removal of pesticides.
- **Rinse washer with an “empty load”**, using hot water and the same detergent, machine settings and cycles used for laundering pesticide-soiled clothing before washing regular loads of family laundry.
- **Line dry** clothes, when possible, to avoid transfer of any pesticide residue to the automatic dryer.
- Always be aware when pesticides are being used, so that clothing is appropriately handled and laundered.

## PARTS PER MILLION (PPM)

Pesticide residue amounts are frequently measured in parts per million. Comparatively speaking, a part per million is a very small amount of a substance. Do not dismiss these small amounts as insignificant. Bear in mind that the cells of tissues where toxicological processes take place are themselves very small units. Many human cells are only a few microns in size.

1 micron = 1/1,000 of a millimeter (0.001 mm) or 1/1,000,000 of a meter (0.000001 m)  
1 millimeter is 1/25 of an inch (0.04 in)  
1 micron is thus equal to 0.00004 in

To put this all in perspective, here are some equivalencies for one part per million:

1 ppm is:

1 milligram per kilogram  
1 millimeter in 1 kilometer  
1 inch in 15.78 miles  
1 minute in 1.9 years  
a 1-gram needle in a little more than a ton of hay  
1 penny in \$10,000  
1 square foot in 23 acres  
1 ounce in 7,812.5 gallons  
1 ounce in 62,500 pounds

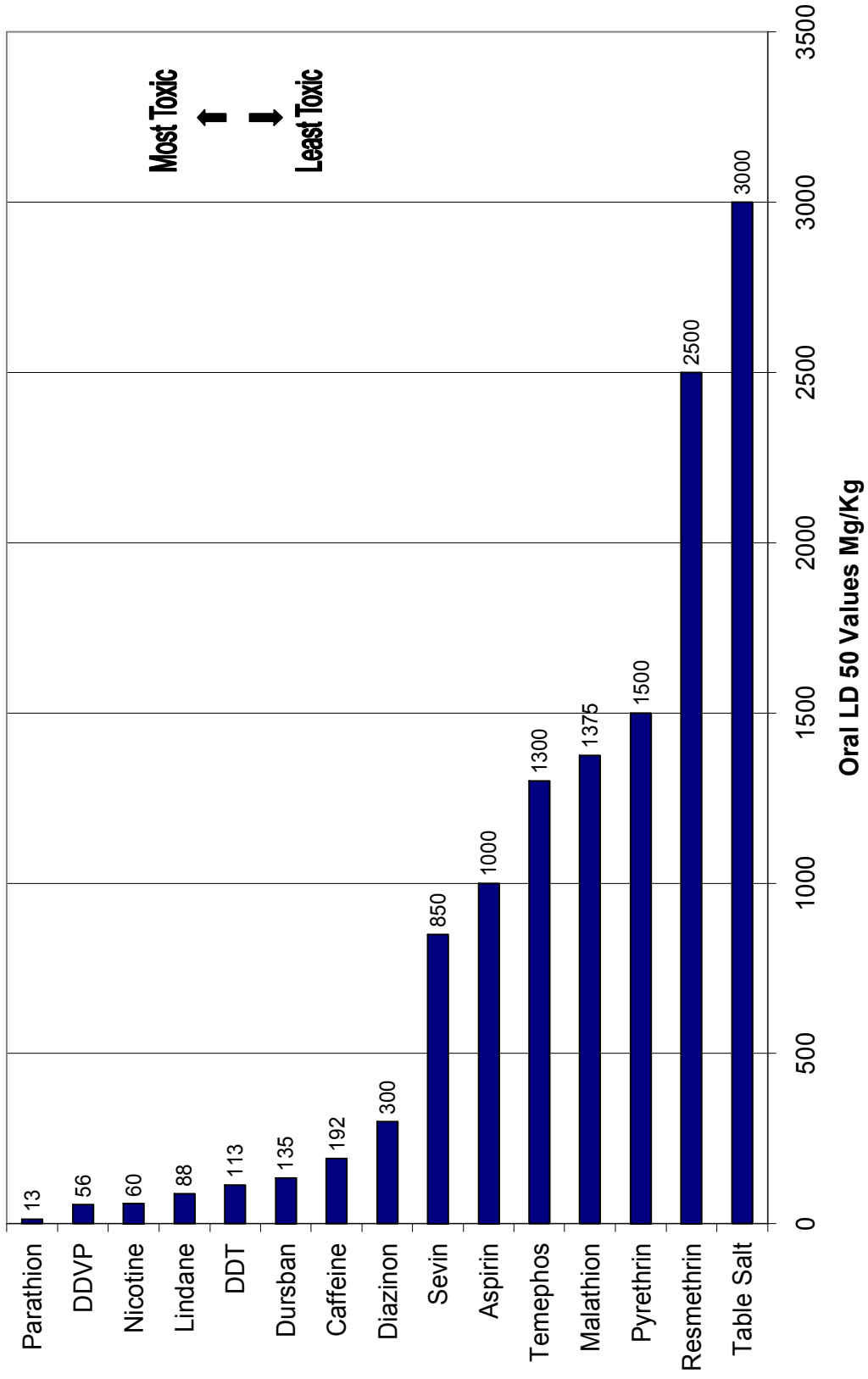
## LD 50

The term LD 50 is the median lethal dose that produces 50% mortality in test animals (usually rats). Lower amounts may also produce mortality. LD 50 is measured in milligrams per kilogram of body weight. The lower the LD 50 value, the more toxic the substance is. For instance, the oral LD 50 of parathion is 13 mg/kg; that is, feeding 13 mg of parathion to rats weighing 1 kg each produces mortality in 50% of the rats. The LD 50 of resmethrin is 2500 mg/kg; each 1 kg rat would have to eat 2500 mg of resmethrin in order to produce 50% mortality. Since pesticides may also be absorbed through the skin, dermal LD 50 tests are conducted also. See the chart on the following page for comparative LD 50 values of certain pesticides, as well as common items we may consume such as aspirin, caffeine and salt.

In general, the following guidelines are used:

<b>Oral LD 50</b>	<b>Relative Toxicity</b>	<b>Signal Word</b>
0 - 50	Highly Toxic	Danger/Poison
50 - 500	Moderately Toxic	Warning
500 - 5,000	Low Toxicity	Caution

# Comparative Toxicity of Selected Substances



# Conversion Tables

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## Metric Measurements & Weights

All metric units have the same prefix to designate the placement of the decimal point:

Deka = multiplied by 10	Deci = divided by 10
Hecto = multiplied by 100	Centi = divided by 100
Kilo = multiplied by 1000	Milli = divided by 1000

**Factoid:**

1 inch of water on 1 acre =  
3,630 cubic feet of water =  
27,156 gallons of water

## Units of Metric Measure

Hectares are used to measure land area.  
Meters are used to measure distance or length.  
Liters are used to measure liquid volume or weight.  
Grams are used to measure dry weight.

## Metric/US Measure Conversions

Metric to US	US to Metric
Hectares x 2.5 = Acres	Acres x 0.4 = Hectares
Centimeters x 0.4 = Inches	Inches x 2.54 = Centimeters
Centimeters x 0.033 = Feet	Feet x 30 = Centimeters
Meters x 1.1 = Yards	Yards x 0.9 = Meters
Grams x 0.035 = Ounces	Ounces x 28.35 = Grams
Kilograms x 2.2 = Pounds	Pounds x 0.45 = Kilograms
Milliliters x 0.035 = Ounces	Ounces x 30 = Milliliters
Liters x 2.1 = Pints	Pints x 0.47 = Liters
Liters x 1.06 = Quarts	Quarts x 0.95 = Liters
Liters x 0.26 = Gallons	Gallons x 3.785 = Liters
Kilometers x 0.6 = Miles	Miles x 1.67 = Kilometers

## Table of Conversion Factors

To Convert From	To	Multiply By
Cubic feet	gallons	7.48
Cubic feet	liters	28.3
Gallons	milliliters	3785
Grams	pounds	0.0022
Grams/liter	parts/million	1000
Grams/liter	pounds/gallon	0.00834
Liters	cubic feet	0.0353
Pints/acre	liters/hectare	1.17
Milligrams/liter	parts/million	1
Milliliters/gallon	gallons	0.0026
Ounces	grams	28.35
Parts/million	grams/liter	0.001
Liters/hectare	pints/acre	0.854
Pounds	grams	453.59
Pounds/gallon	grams/liter	119.84

## US Measures

### Linear Measure

1 foot = 12 inches

1 yard = 3 feet

1 rod = 5.5 yards = 16.5 ft

1 mile = 1760 yards = 5280 ft

### Cubic Measure

1 cu ft = 1728 cu in = 7.48 gal

1 cu yd = 27 cu ft

### Liquid Capacity Measure

1 tablespoon = 3 teaspoons

1 fluid ounce = 2

tablespoons

1 cup = 8 fluid ounces

1 pint = 2 cups = 16 ounces

1 quart = 2 pints = 32

ounces

1 gallon = 4 quarts = 128 ounces

1 gallon water = 8.34

pounds

### Square Measure

1 sq ft = 144 sq inches

1 sq yard = 9 sq feet

1 acre = 43560 sq ft = 4840 sq yds = 209 feet square

1 sq mile = 640 acres = 1 section

### Weight Measure

1 pound = 16 ounces

1 ton = 2000 pounds

### Rates of Application

1 ounce/sq ft = 2722.5 lb/acre

1 ounce/sq yd = 302.5 lb/acre

1 ounce/100 sq ft = 27.2 lb/acre

1 pound/100 sq ft = 435.6 lb/acre

1 pound/1000 sq ft = 43.6 lb/acre

1 gallon/acre = 3 ounces/1000 sq ft

5 gallons/acre = 1 pint/1000 sq ft

## Miscellaneous Conversions

1 kilogram (kg) = 1000 grams (g) = 2.2 lbs

1 gram (g) = 1000 milligrams (mg) = 0.035 ounce

1 liter = 1000 milliliters (ml) = 1.058 quarts

1 ml = 1 cubic centimeter (cc) = 0.035 fluid ounce

1 milliliter of water weighs 1 gram

1 liter of water weighs 1 kilogram

1 pound (lb) = 453.6 grams

1 ounce = 28.35 grams

1 pint of water weighs approximately 1 lb

1 gallon of water weighs approximately 8.34 lbs

1 gallon = 4 qts = 3.785 liters

1 qt = 2 pints = 0.946 liters

1 pint = 0.473 liters

1 fluid ounce = 29.6 milliliters

1 part per million (ppm) = 1 milligram/liter = 1 milligram/kilogram

1 percent = 10,000 ppm

.0001 percent = 1 ppm

### Circles (pi = 3.14)

Circumference =  $2 \times \pi \times \text{radius}$  ["2 pi r"]

Area =  $\pi \times \text{radius} \times \text{radius}$  ["pi r<sup>2</sup>"]

Diameter = Circumference  $\div$  3.14159

## CONTROLLING ADULT MOSQUITOES

### VEHICLE SPEED IN MPH

	5	10	15	20
ACRE/HR	181.8	363.6	545.4	727.2

(300 ft. swath width is assumed)

### APPLICATION RATES

OZS/MIN	2.5	3.0	4.3	6.0	8.0
GALS/HR	1.17	1.4	2.0	2.8	3.75

### TO FIND ACTIVE INGREDIENT PER ACRE

- A. Divide active ingredient (AI) per gallon of concentrate by total gallons of mix. (Skip this step if applying undiluted product).
- B. Multiply (A) times the gallons per hour.
- C. Divide (B) by the acres per hour.

**Note:** The maximum application rate for pyrethroids is 0.007 lb. active ingredient/acre. It is recommended that it not be applied at a rate lower than 0.001 lb. AI/acre.

### TO FIND COST PER ACRE

- A. Add cost for concentrate and solvent oil or diluent.
- B. Divide by total gallons of mix.
- C. Multiply (B) times gallons per hour.
- D. Divide (C) by acres per hour.

These calculations are courtesy of David Sykes, Aventis, Inc.

## INSECTICIDES FOR MOSQUITO CONTROL – 2008 \*

### Pre-Larvicides

Most granular, pellet and briquet formulations of larvicides may be applied as a pre-larvicide to low-lying areas that will become flooded. The active ingredient will activate upon flooding and control the mosquito larvae.

### Larvicides

1. *Bacillus thuringiensis* var. *israelensis* (*Bti*) (Several brands available: Summit, VectoBac, Aquabac) – aqueous suspension, technical powder, granules, and briquets
2. *Bacillus sphaericus* (VectoLex) – granules, water soluble pouch for control of certain mosquito species, particularly in highly polluted waters
3. Methoprene, an insect growth regulator (Altosid) – briquets, granules, liquid, liquid concentrate, extended residual briquets and single brood granules
4. Monomolecular surface film for larval and pupal control (Agnique, Arosurf)
5. Petroleum oil for larval and pupal control (GB 1111)
6. Temphos (Abate), an organophosphate

There are also *Bti* and Methoprene formulations marketed for homeowners such as Mosquito Dunks, Mosquito Bits and Pre-Strike. Those labels are not included here.

### Adulticides for Ultra-Low-Volume (ULV) Foggers

Synthetic Pyrethroids with Piperonyl Butoxide as synergist:

1. Scourge (resmethrin): 4 + 12 and 18 + 54 (RESTRICTED USE)
2. Biomist (permethrin): 3 + 15 and 30 + 30
3. Anvil (sumithrin): 2 + 2 and 10 + 10
4. Aqua-reslin (permethrin)
5. Permanone (permethrin): RTU, 10% EC, 31-66 and 30-30

Organophosphates:

1. Dibrom Concentrate (naled)
2. Fyfanon ULV (malathion)
3. Mosquito Master 412 (chlorpyrifos and permethrin)
4. MosquitoMist One ULV (chlorpyrifos)
5. Trumpet EC (naled)

\* This list is not to be construed as an endorsement of any product by the New Mexico Department of Health. It is solely intended to provide names of products registered and available in New Mexico. This list is not all-inclusive and other products may be available. Consult with the Pesticide Compliance Program of the New Mexico Department of Agriculture or your distributor for more information on these and other products and current registration status.