

Pesticide Safety For Agricultural Workers



About FARSHA

Since 1993, the Farm and Ranch Safety and Health Association (FARSHA) has promoted safety and health in BC farming, through ongoing activities around the province, and through the development of commodity-specific practical tools such as safety programs, training courses, and workplace reviews. FARSHA has published educational materials on a wide variety of topics, and operates a web site and an extensive lending library.

FARSHA was launched in 1993 at the initiative of the Workers' Compensation Board of BC (now WorkSafeBC), the BC Federation of Agriculture (now the BC Agriculture Council), and the Canadian Farmworkers' Union. FARSHA's work is funded by a levy on the assessments paid to WorkSafeBC by the registered farm employers in British Columbia. Therefore, FARSHA's services are provided free of any additional charge to employers and workers in BC agriculture.

FARSHA is independent of WorkSafeBC, and plays no role in its regulatory enforcement, collection of insurance assessments, or the provision of workers' compensation services. (On July 1st 2005, the Workers' Compensation Board of BC began to use the name WorkSafeBC. Many publications of FARSHA and WorkSafeBC continue to use the old name: the Workers' Compensation Board, or WCB.)

This pesticide safety booklet is intended as a guide to general safe handling of pesticides and may not cover all aspects of safe operations. It is developed with the aim of reducing chemical-related injuries and exposure by emphasizing the hazards and recommending safe work practices. It is intended for educational purposes, and is based on information provided by WorkSafeBC and other recognized sources. FARSHA assumes no responsibility or liability for the application of this information, recognizing that circumstances, conditions, and other factors may vary greatly.

FARSHA welcomes your inquiries and comments on this booklet. For more information, or to receive a FARSHA *Resource Material Catalogue*, which lists all FARSHA's available farm safety information, please contact:

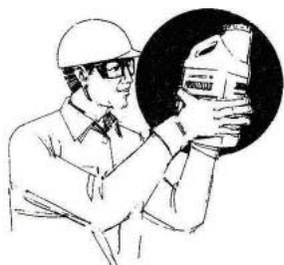
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Table of Contents

Use of Pesticides	1
Transporting Pesticides	1
Storing Pesticides	2
Loading and Mixing Pesticides	3
Application of Pesticides	4
Pesticide Applicator Certification for Agricultural Producers	5
Restricted Entry Intervals	7
Pesticide Drift	7
Disposal of Unused Pesticides and Containers	8
Personal Hygiene and Protection	8
Use of Personal Protective Equipment to Guard Against Pesticides.....	10
The Half-Face Chemical Cartridge Respirator.....	11
Positive Pressure Test for Half-Face Respirators.....	11
Negative Pressure Test for Half-Face Respirators	12
Respirator Use with Facial Hair	12
Symptoms of Pesticide Poisoning.....	14
How Do Pesticides Enter the Body?	15
If Someone Has Been Exposed to Pesticides.....	17
Plan in Advance for Emergency Response.....	19

When insects and other pests that attack crops reach damaging levels, farmers use pesticides or other types of controls to protect the crop. In general, pesticides can be harmful to health and damaging to the environment if used improperly. If pesticides are used correctly and only when necessary, the incidents of accidental exposures can be significantly reduced.

Use of Pesticides



Only use pesticides when necessary and as part of an Integrated Pest Management Program. Before handling a pesticide, read the label instructions and information on the containers. The laws say you must follow directions on the label. If you do not follow the instructions on the label, handling pesticides could prove to be very dangerous.

Before handling the chemical, obtain necessary information from your employer or someone knowledgeable about the chemical. Use pesticides only if you are familiar with the instructions and have authorization from your supervisor. To protect yourself and others follow these recommended safe work practices.

Transporting Pesticides

Big risks can be involved in transporting pesticides from one place to another and can result in injury to people or harm the environment. If the pesticide spills on the road while being transported, it could spread dangerously due to vehicle traffic, affect houses in the neighborhood, harm crops in nearby fields, or contaminate nearby ditches or canals. While transporting chemicals remember that you are responsible for keeping them safely in your vehicle. The following guidelines can prevent dangerous accidents from happening:

- Lock up pesticides if you leave your vehicle.
- Never transport chemicals in the cab of your vehicle.
- Do not allow anyone to ride in the load area with pesticides.
- Never transport feed alongside pesticides, to prevent cross contamination.

- Make sure chemical containers cannot break, leak, move around, or be stolen during transport.
- Protect paper and cardboard pesticide containers from water or moisture.
- Carry spill clean-up equipment and know what to do in case of a spill.

Storing Pesticides

Pesticides must be stored safely to prevent exposure of workers to spills or vapours, and to prevent people from eating or drinking from pesticide containers, and to protect the environment.



- Locate your pesticide storage area away from wells, ditches, or bodies of water. This will help prevent water contamination in the event of a spill.



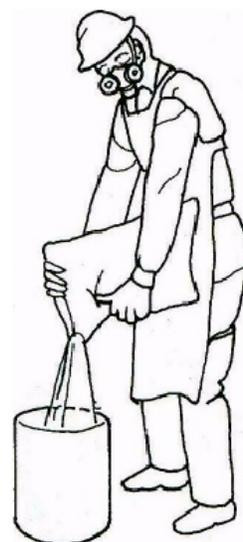
- Store pesticides in a well-insulated room with a clearly visible warning sign (commonly red and yellow in colour) and a lock on the door. Lighting should be sufficient to permit easy reading of labels on pesticide containers.
- Only authorized people should enter the storage area.
- Read pesticide labels for storage precautions. Always store in dry conditions at correct temperatures.
- Ensure that the chemical storage area is well ventilated to the outside, because the build-up of chemical fumes in the storage area can be harmful.
- Store pesticides in original containers with original labels. If you must use a different container, place a label on it.

- Never store chemicals in unlabelled bottles, kitchen containers, or buckets. You or someone else may become a victim because of mistaken identity.
- Herbicides should be stored separately from other types of pesticides, to prevent cross-contamination.
- Keep chemicals away from children.
- Keep food, animal feed, or seeds out of the chemical storage area.
- Keep an inventory of the chemicals in the storage area along with material safety data sheets (MSDSs.) These should be available for all emergency response personnel, including fire fighters.
- A fire extinguisher approved for chemical fires, broom and shovel, absorptive material, and protective clothing and equipment must be kept near your storage area.

Loading and Mixing Pesticides

Ensure that workers or any others who mix, load, or apply moderately or very toxic pesticides hold a valid pesticide applicator certificate. Follow these procedures:

- Before handling chemicals wear personal protective equipment, and obtain adequate instruction in safe work procedures to protect yourself from the harmful effects.
- Mix pesticides outside. If you have to mix the pesticide inside make sure there is good ventilation, and ensure that ventilators are open and functioning.
- If the wind is blowing, always stand upwind so that pesticide splashes or fumes do not affect you.
- Never open cardboard or paper containers with your bare hands. Wear rubber gloves and always use a sharp knife or cutter.
- Ensure that washing facilities and eyewash equipment are available at the mixing or loading site.



- Keep your face away from the container while pouring or emptying pesticides to prevent splashes or dust getting into your eyes. Wear a face shield, or appropriate eye protection, and a respirator if necessary.
- If the chemical spills on you while mixing or filling your tank:
 - Stop work, wash immediately, and remove contaminated clothing.
 - Wash with soap and clean water, and wash your clothes. The faster you do this, the safer you are from getting exposed.
 - Dispose of heavily contaminated clothes (do not wash).
- Ensure there is enough water for clean-up and emergencies. Also keep absorbent material like lime, coarse clay, sand, or sawdust available nearby.

Application of Pesticides

Accidental exposures may occur if proper procedures are not followed during application. You can prevent most exposure-related incidents by using the following guidelines:



- Before using the pesticide, read the label on the container carefully. Although you may think you remember what's written on the label, manufacturers sometimes change instructions based on the latest research and information. Reading the label before using a pesticide is very important.
- Properly check spray equipment before filling the sprayer with pesticide. Check all pipe joints, nozzles, and filter seals to ensure that the mixed pesticide does not leak.
- Never use more pesticide than the amount recommended on the label. Remember that higher concentrations and amounts may cause more damage than good.
- Calibrate equipment properly before use, and use it according to specified instructions only.

- Make sure all people and animals are out of the treatment area before spraying.
- Do not spray in windy conditions, to prevent drift into adjoining properties.
- Never work alone with very toxic pesticides.
- Learn to recognize the typical signs and symptoms of pesticide poisoning.
- Ensure that people are aware of your work location.
- Ensure that the pesticides do not enter water in ditches, ponds, lakes, streams, or canals. This can harm the environment.
- Before spraying, ensure that appropriate warning signs are conspicuously posted at normal points of worker entry to the spray site.



- These warning signs should be clearly readable for the prescribed posting period, and shall provide information in a manner that can be readily understood by workers. (The sign shown here is available from FARSHA.)
- Maintain a record of pesticide applications which includes the crop treated, area treated, pesticides used, rate of application, date and time of application, and the date on which workers were allowed to enter the field.

Pesticide Applicator Certification for Agricultural Producers

Pesticide use in BC farm workplaces is addressed in two provincial laws: the *Integrated Pest Management Act and Regulations* (administered by the Ministry of Environment), and the *Occupational Health and Safety Regulation* (administered by WorkSafeBC).

Under these laws, you are required to have a valid Pesticide Applicator Certificate (PAC) if you:

- Buy or use any restricted-use pesticide (these are products known

to pose high risks to humans and the environment.)

- Mix or apply any pesticide classified as moderately or very toxic to humans
- Apply pesticide as a service (as a paid contract or custom applicator).

(Note that the holder of a PAC is not permitted to buy pesticides and then give or resell them to someone who does not have a valid PAC.) There are some other circumstances which require a Pesticide Applicator Certificate as well; consult FARSHA if you are unsure about any pesticide-related activity you are planning.

How will you know if a pesticide is classified as restricted-use? The product label will show the word “restricted” in bold letters.

How will you know if a pesticide is classified as slightly, moderately, or very toxic to humans? Contact the product vendor or supplier or, your local field agent. This information is also available on-line, at http://www.agf.gov.bc.ca/pesticides/a_1.htm#table

To obtain a Pesticide Applicator Certificate, you have three options:

- Self-study
- A classroom course
- A challenge exam.

The PAC exams are specific to each type of work, and are regularly revised, so begin by identifying the type of certificate you need, and make sure that you have an up-to-date version of the study materials.

The provincial Distribution Centre in Victoria supplies the self-study kits; call 1-800-282-7955 for more information. Classroom courses are offered around the province: through some community colleges, by private consultants, and by FARSHA. FARSHA’s courses are available in either English or Punjabi. If you are confident that the course is not necessary, you can simply write the exam through an arrangement at your local Government Agent’s office, or by calling 1-800-205-2102.

The PAC is valid for a one-year or five-year period, depending on your examination score (60% is the minimum passing mark, however). The examinations are “open book,” with multiple-choice questions.

In the Lower Mainland and the Okanagan a re-certification credits program is in place for people with a five-year PAC. Contact FARSHA for up-to-date information on the program.

Restricted Entry Intervals

Re-entering a sprayed field without protective clothing too soon after application can be very hazardous. Usually, the pesticide label clearly states the re-entry interval, which is the time people must wait before going into the field after pesticides are applied. If no re-entry interval is stated, use the following rules:

- 24 hours for pesticides classified as slightly toxic.
- 48 hours for pesticides classified as moderately or very toxic.

Note: If anyone is authorized to enter a field before the re-entry period is over, ensure the worker is provided with and wears the personal protective clothing and equipment stated on the label.

Pesticide Drift

Spray drift is the airborne movement of spray droplets or vapours away from a treatment site during application. You must minimize the drift of pesticides toward nearby water, crops, livestock, and adjoining residential areas every time you spray. Keep in mind that drift increases when: wind speeds and air temperature increase; relative humidity is low; nozzle pressure and boom pressure are high, and spray droplets are small. Drift can also occur as a result of temperature inversion, caused due to entrapment of cool air below warm air. This cool air in turn moves sideways carrying with it small droplets deposited on nearby areas.

Pesticide drift can be minimized in the following ways:

- Select the correct nozzle type and low spray pressure to produce the largest size droplets suitable for your application.

- Replace worn nozzles.
- Avoid spraying in windy conditions.
- Add a drift control agent in the spray mix.
- Spray downwind from sensitive areas such as houses, beehives, playgrounds and schools.
- Don't spray when the temperature is above 30°C or when there is a temperature inversion (the entrapment of cool air under warm air, resulting in the sideways movement of the air.)
- A canopy of trees or a hedge planted around the perimeter of the sprayed field also helps reduce pesticide drift.

Disposal of Unused Pesticides and Containers

Storing unwanted pesticides can be hazardous to people or the environment. Contact your local Ministry of Environment office for information on waste pesticide disposal. Safe disposal of empty containers is another important issue. Triple-rinse plastic and glass containers. Put the rinse water into the sprayer and puncture the containers so they cannot be reused. Store the empty containers in a safe place until you can take them to a pesticide dealer collection site.

Personal Hygiene and Protection

For personal protection follow the instructions below:

- Never wear contact lenses when handling pesticides, since some lenses are permeable to vapours/gases and can trap chemicals.
- Take a shower with soap after using pesticides. Clean hair and fingernails carefully and wear clean clothes afterwards.
- Do not eat sprayed vegetables or fruit until the correct days before the harvest have passed. Consult your production guide or pesticide label for days until harvest.
- On the farm do not drink from a cup or container unless you are sure it is safe. Empty unlabelled containers may have held pesticides.
- After spraying, remove and keep your pesticide work clothes in a separate secure place away from clean personal clothing. Do not

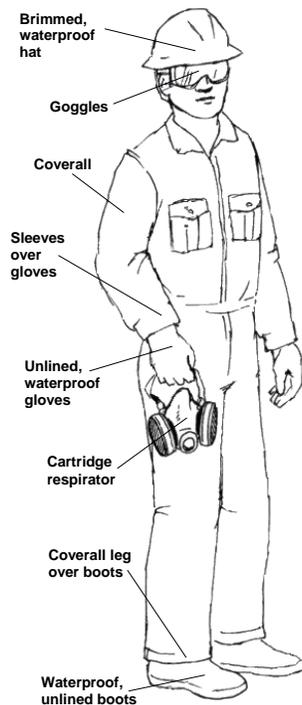
let children play with the work clothes.

- Use rubber gloves to handle contaminated clothing. Pre-soak contaminated clothing using the pre-soak cycle, and wash work clothes separately.
- Wash pre-soaked clothing on normal cycle, using hot water and heavy duty detergent. Use a high water level. Clean the machine afterwards, by running another cycle with hot water, detergent and no clothing to remove any pesticide residue.
- Hang the clothes outside to dry in the sunlight if possible.

Use of Personal Protective Equipment to Guard Against Pesticides

Pesticides can be dangerous if proper precautions are not taken. The use of personal protective equipment (PPE) is essential. For proper protection read the instructions on the label of the container. Follow these recommended guidelines:

- Wear unlined rubber or neoprene gloves before you handle pesticides. Ensure the gloves are in good shape and not torn, leaking or cracked.
- Wear a waterproof apron when mixing and loading concentrated pesticides as extra precaution to prevent entry of pesticides through the skin.
- Wear a water-repellent, tear-resistant and chemical-proof spray suit that covers the entire body.
- Wear comfortable clothes which are not tight.



Personal Protective Equipment for Applying Pesticides

- Wear knee-high unlined rubber boots. Ensure that your pant legs cover your boots to the ankles. Remember leather and canvas absorb pesticides. Contaminated footwear made of these materials will continually expose the feet to pesticides.
- While mixing the pesticide, use a face shield or safety goggles for your eye protection. Clear plastic visors (face shields) prevent splashing while pouring, mixing, or loading pesticides. Wear a rubber or plastic rain hat or other waterproof headgear along with a neck cape for maximum protection. Most pesticides require special breathing protection (some type of respirator) for use. Read the instructions on the container label to find out whether you need a respirator.

The Half-Face Chemical Cartridge Respirator

- A half-face respirator **must** be fitted to the user's face. Have the safety equipment company fit you properly for your respirator, or contact the FARSHA Regional Safety Coordinator for fit testing.
- Use a chemical cartridge respirator when recommended on the product label. Change the chemical cartridge regularly as recommended by the manufacturer, or sooner if you can taste or smell a pesticide vapour, or if your breathing is restricted.
- If you have facial hair, scars, or for some other reason you are unable to use a half-face respirator, you must use a different type of respirator that relies on air pressure rather than a tight-fitting seal for protection.
- A half-face cartridge respirator is fitted to one person only, and must not be used by other people.
- After use of a respirator wash it with warm water and detergent, rinse, and air dry. When not in use, store the respirators and cartridges in a sealed plastic bag away from the pesticide storage area to prevent contamination.
- Each time you use your half-face respirator, you must check to make sure it still provides a complete seal. Here is how to check your respirator:

Positive Pressure Test for Half-Face Respirators

- 1). Put on the respirator according to the manufacturer's instructions.
- 2). Block the exhalation valve with the palm of your hand.
- 3). Gently exhale. Hold for about ten seconds.



- 4). See if the facepiece bulges slightly.
- 5). Try several facial expressions, such as a smile or a frown.
- 6). If the facepiece is still bulging and there are no air leaks between the face and the facepiece, the respirator fits properly.
- 7). If you feel air leaks re-adjust your respirator to ensure a tight fit. Do not use if you cannot prevent leaks.

Negative Pressure Test for Half-Face Respirators

- 1). Put on respirator according to manufacturer's instructions.
- 2). Place hands over the respirator's cartridge openings.
- 3). Gently inhale. Hold for about ten seconds.
- 4). See if the facepiece collapses slightly.
- 5). Try various facial expressions, such as a smile or a frown.
- 6). If the facepiece remains collapsed, and there is no air leak between the face and the facepiece, the respirator fits properly.
- 7). Ensure that you have a tight fit. Do not use if you cannot prevent leaks.



Respirator Use with Facial Hair

To be effective, a half-face cartridge respirator (as discussed above) must seal tightly against your skin. This forces all the inhaled air to pass through the purifying filter cartridges for removal of contaminants. A beard, goatee, bushy mustache, or facial scars will interfere with the respirator's seal, contaminated air will enter the

mask, and you will not be protected from the harmful effects of the pesticides.

You do have other options. There are respirators with a loose-fitting hood that extends down over the shoulders. A continuous supply of clean breathable air is blown through the hood. Because this air is constantly flowing out from under the edges of the hood, it is not possible for contaminated air to flow back and reach your face.

There are various models of these respirators. One is the powered air-purifying respirator (PAPR), in which air passes through a purifying filter worn on a small body-pack. Another is the supplied air respirator (SAR), in which clean air is supplied through a flexible hose from a special air compressor. There are some limitations with these respirators, and each must be chosen carefully according to the type of pesticide and the planned work activity.

FARSHA strongly urges you to consider the type of respiratory protection you are using during pesticide application and handling – is it appropriate?



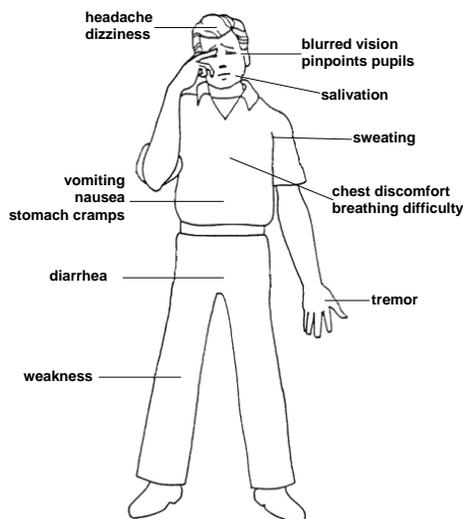
Symptoms of Pesticide Poisoning

The effect of pesticides can either be acute (short-term) or chronic (long-term). It is important to recognize the symptoms of acute exposure to chemicals.

Immediate treatment can mean the difference between mild effects and serious illness. Ensure that a worker who has been severely exposed to a pesticide or is suspected of pesticide poisoning is taken to a physician without delay for medical examination. Do not attempt a self diagnosis. See your doctor right away.

The following symptoms are general for all pesticides. Symptoms may be mistaken for the flu and include:

- Headache, fatigue, nausea, and stomach cramps.
- Thirst, nervousness, diarrhea, and moodiness.
- Loss of appetite or weight, dizziness, and weakness.
- Constricted pupils, blurred vision, and irritation of eyes, skin, nose, and throat.



The full impact of poisoning may not occur right away. In cases of skin absorption it can take up to 12-24 hours. Symptoms of severe poisoning are often specific in nature and require immediate hospital treatment.

Severe symptoms of pesticide poisoning may include:

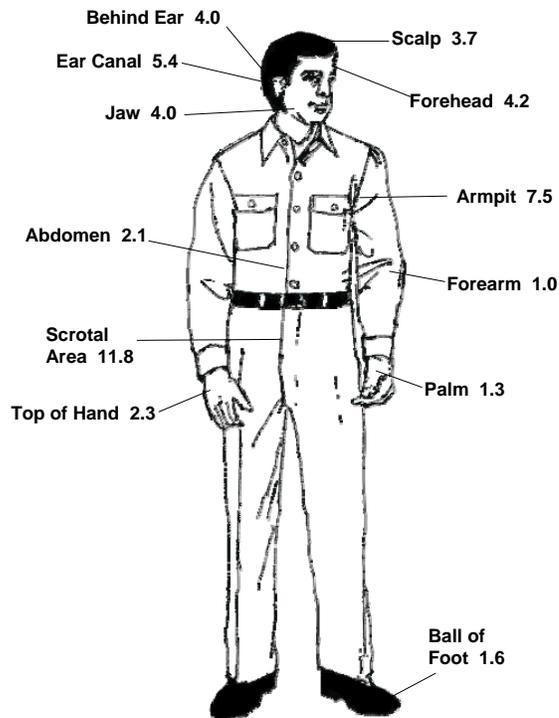
- Difficulty in breathing (respiratory distress)
- Fever and loss of reflexes
- Muscle twitching, convulsions, and unconsciousness.

Some chemical classes of pesticides produce very specific effects. For example, exposure to organo-phosphates (OPs) and carbamates (CBs) can result in pin-point pupils (a condition called miosis).

How Do Pesticides Enter the Body?

Pesticides, like any chemical product, can enter the body through various routes:

- **Inhalation (breathing).** If pesticides are airborne, they can be inhaled into the lungs, and from there, enter the bloodstream. This is why a respirator must be used.
- **Ingestion (swallowing).** Pesticides or pesticide residue can be accidentally swallowed, and cause health effects through the digestive system. A harmful amount can be swallowed – unknowingly – if you have pesticide residue on your hands, and then smoke or eat. This is why you must wear impermeable gloves, and wash your hands thoroughly before smoking or eating.
- **Absorption through the eyes.** If splashed in the eyes, many pesticides can cause extreme and permanent damage, including blindness. Always protect your eyes with splash-proof goggles. Consider the location of the nearest clean running water – if splashed in the face with pesticide, you will need to thoroughly flush the eyes with lots of clean water, without delay.
- **Absorption through the skin.** The most common route of exposure for pesticide applicators is through the skin. **All** areas of skin can absorb dangerous quantities of pesticides. But, did you know that some areas of the body absorb pesticides much more easily than others?



Skin absorption rate of the forearm, compared to other parts of the body.

This illustration uses the skin absorption rate of your forearm (shown here as 1.0) as a comparison to the skin absorption rate of other parts of the body.

The palm of the hand and the ball of the foot absorb pesticides somewhat more easily than the forearm (about 1.3 to 1.6 times as easily). You can see from the illustration that the scalp absorbs pesticides 3.7 times as easily as the forearm, for example. Therefore, the skin of the top of the head, the face, and the ears absorb pesticides almost **five times** as easily as the skin of the forearm.

However, note that the skin of the genital area absorbs pesticides nearly twelve times as easily as the forearm! Always wash your hands thoroughly before going to the toilet, to prevent this type of skin absorption.

If Someone Has Been Exposed to Pesticides

Always protect yourself before helping out: put on gloves, protective clothing, and a respirator. Respond calmly but quickly, to prevent rapid absorption into the affected person's body.

- **Call emergency assistance immediately** (911 or other emergency number, a doctor, or the Poison Control Centre). Tell them the name of the pesticide and the PCP registration number (from the package label), and explain what happened. Follow the directions you are given for emergency care.
- Remove the affected person to a safe uncontaminated surrounding, and remove heavily contaminated clothing. Give the person a good bath.
- If the affected person has an irregular heartbeat or feels unusually cold, consult a doctor immediately.
- If going to the hospital, take a sample packaging label and the MSDS sheet, along with a sample of vomit if available.
- Never try to give anything by mouth to an unconscious person.

Follow these steps to minimize absorption and the effect of pesticide exposure on the exposed person's body.

Pesticide exposure to the body (skin):

- Remove contaminated clothing.
- Give the exposed person a bath with soap and clean water. Rinse in fresh clean water.
- Wrap the person immediately in a warm blanket.

Pesticide exposure to the eyes:

- Call a doctor or the Poison Control Centre immediately.
- Rinse the eyes with fresh clean water for 15 minutes, holding the eyelids open for thorough cleaning.
- Do not put any medication in the eyes.

Pesticide exposure to the lungs (inhalation):

- Call for emergency assistance (911 or other number) immediately.
- Ensure that the affected person is in a well-ventilated place, with access to clean fresh air.
- If you know how, begin resuscitation if breathing has stopped or is difficult. Use a plastic face mask to protect yourself from contamination.
- Loosen all tight clothing.
- Keep the exposed person's head upwards so that he or she can breathe easily.
- Wrap the exposed person in a warm blanket.
- Do not give the exposed person alcohol to drink.

Pesticide exposure by swallowing (ingestion):

- Send for the emergency medical service immediately.
- Do not induce vomiting in the exposed person unless recommended on the label of the container. If a corrosive poison has been swallowed, and the victim is conscious, give milk, water, or milk of magnesia to drink.
- If a non-corrosive poison has been swallowed, induce vomiting by tickling the back of the victim's throat with your finger or using the handle of a spoon. Syrup of ipecac followed by water can also be administered to induce vomiting if advised by a doctor, or poison control.
- Monitor the heart rate and respiration. If trained, perform CPR if required.



Plan in Advance for Emergency Response

Always plan for first aid and emergency care in advance. Pesticide spills can involve anything from a leaking container to the contents of a fully loaded spray tank. To prevent spills, keep your sprayer in good condition, fix leaks and drips, and drive carefully. Be prepared for accidental spills. Always keep the following on hand.

- A list of emergency telephone numbers, including:
 - Poison Control Centre
 - Doctor
 - Ambulance
 - The 24-hour Provincial Environmental Emergency Number: 1-800-663-3456. Call this number to report spills of more than one litre or one kilogram of pesticide. Ask for spill clean-up advice or assistance if required.
- Emergency protective gear and equipment
- Absorptive material (kitty litter or clay)
- A container for contaminated waste (garbage bag or can)
- Tools to pick up contaminated material (broom, shovel)
- Bleach and hydrated lime to decontaminate spill areas.

For questions involving non-emergency pesticide exposure:

Call the BC Drug and Poison Information Centre
(available 24 hours every day)

In the Lower Mainland area: 604-682-5050

Elsewhere in BC: 1-800-567-8911

After the immediate emergency has been resolved, remember that it must also be reported to WorkSafeBC. For any incident that required medical treatment, use an *Employer's Report of Injury or Occupational Disease* (also called a *Form 7*). For any incident that involved a major release of a hazardous substance, call WorkSafeBC at 1-888-621-7233.

Other important emergency contact information (family doctor, neighbors, relatives):

Suite 311, 9440 – 202 Street
Langley, BC V1M 4A6

Tel. 604-881-6078

Fax: 604-881-6079

Toll Free: 1-877-533-1789

Email: farmsafe@farsha.bc.ca

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