Ontario Pest Management Industry
PIC and PIRC
Pesticide Technician Program

Basic Pesticide Safety Course

Technician Training Manual

Independently administered by the

Pesticide Industry Council (PIC)
1-800-265-5656 or
visit www.ptppic.com

And / Or

Pesticide Industry Regulatory Council (PIRC)
1-800-615-9813 or
visit www.oipma.ca

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The original Pesticide Technician Manual was developed, written, and its coordination overseen and completed December 1999, in a tripartite manner by the members of the Pesticide Technician Advisory Committee (PTAC). The PTAC at that time consisted of the following members from the Pesticide Industry Council (PIC), the Pesticide Industry Regulatory Council (PIRC), and the Ontario Ministry of the Environment (MOE):

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Alternates:
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The key knowledge components in this manual were approved by the MOE. The Supplementary Information in this manual is provided separately by the PIC and PIRC.

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Pesticide Technician Training Manual

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This publication contains references to specific products. It does so for educational purposes only, and the references should not be viewed as an endorsement of a particular product.

This publication does not contain information or suggestions for the use of particular pesticides for specific pest management problems. Specific pest management measures have been intentionally omitted because they are subject to changes and may become obsolete quickly.
## The Process of Becoming a Pesticide Technician

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<th>Description</th>
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<td>Complete an approved basic pesticide safety course</td>
<td>Regulation 63/09 of the <em>Pesticides Act</em> requires unlicensed assistants to a licensed exterminator to successfully complete a basic pesticide safety course to become a <strong>Technician</strong>. This course must be approved by the Ministry of the Environment (MOE) through a Director under the Pesticides Act. In addition, there are specific trainee and technician supervision requirements for licensed exterminators.</td>
</tr>
<tr>
<td>Trainee must work under direct supervision</td>
<td>Candidates are deemed to be a “<strong>Trainee</strong>” when they perform or assist in the performance of exterminations under the direct supervision of a licensed exterminator.</td>
</tr>
<tr>
<td>The Pesticide Technician Program (PTP)</td>
<td>The candidate (and/or trainee) must successfully complete the basic pesticide safety course consisting of an academic and practical component to be deemed a “Technician”. The technician is allowed to use certain pesticides under the indirect supervision of a licensed exterminator.</td>
</tr>
<tr>
<td>The academic component</td>
<td>The PIC or PIRC can provide you with a list of accredited Examiners / Trainers, a copy of the Technician Manual, record your enrollment and register your completion of the basic pesticide safety course. Alternately, you can complete the technician training “in-house” through your employer who is, or has on staff, a qualified accredited PIC and/or PIRC Examiner. The Examiner will forward the results to the council named in Part F of the Technician Identification Card (TIC).</td>
</tr>
</tbody>
</table>

The academic component is a 50 question, multiple-choice, open book examination based on the key knowledge components in this manual. A pass mark of 75% or greater is required on the examination. You have one hour and thirty minutes to complete the academic examination.
### The practical component

The practical component consists of demonstrating to a licensed exterminator your competency in performing the five mandatory basic practical pesticide safety tasks (See Part 1 of the Practical Pesticide Safety Training Document (Appendix B). Once the **Academic Examination** and **Practical Demonstration** are performed to the satisfaction of the Academic Examiner and Licensed Exterminator they will sign, date, and include their licence number on the Technician Identification Card (TIC) (see Appendix C).

The in-house practical demonstration for those employed within the licensed pest management industry must be completed **within 30 days**, before or after the date of passing the academic component.

Candidates not employed by the pest management industry (who have taken the examination through a school) have **365 days** to complete the practical component.

### In-house process: enrollment and registration

When the technician training is taken in-house by the candidate, the Academic, Practical, and the enrollment and registration can be completed on the same day, through the Accredited PIC or PIRC Examiner. The candidate should ensure that their technician information is delivered to the directed council under an in-house employer situation through confirmation from the Accredited Council Examiner. Once the practical component is completed and “signed off”, the practical information is required to be sent by the practical Examiner, to the TIC issuing PIC or PIRC WITHIN FIVE WORKING DAYS. Once signed by the examiner the TIC is the property of the technician.

### Technician specific training requirements

Before a technician can apply any pesticide as an assistant to a licensed exterminator the assistant must be provided with specific training: training specific to the type of pest management activities, the specific pesticides and application equipment to be used as well as applicable special precautions and safety procedures.

### Responsibility of supervising exterminator

Under Ontario Regulation 63/09, an exterminator who supervises the work of a technician or trainee shall:

a) ensure that the technician or trainee receives any necessary training relating to the specific work that he or she will be performing, and,

b) make a record respecting the training.
Records must be kept by employer

In addition, Ontario Regulation 63/09 requires that the employer of the trainee or technician shall keep the record until at least two years after the trainee or technician leaves the employer’s employment.

Specific training must be recorded

See Appendix B

The document that can be used to record this specific training is found in PART II of the Practical Pesticide Safety Training Document, (see Appendix B) or other similar document, e.g., the Technician Certification of Competency and Limitations (TCCL).

Renewing your technician status

Your status as a technician expires 24 months from the date of passing the Academic Examination. Prior to the expiry date, in order to continue using pesticides as a technician, you must re-enroll in a course approved by the MOE which requires the successful completion of both the academic and practical components.

Lost or damaged technician cards

If your personal information changes on the Technician Identification Card (TIC) or the card is damaged or lost, you must notify the administrating council (PIC or PIRC) within SEVEN WORKING DAYS. This will allow the new information to be updated or a replacement card to be issued. A reissued replacement card retains the original TIC Number and the original date of issue expiry date.

How to use this training manual

This Technician Manual provides you, the candidate, with the information you need to know in order to successfully complete the academic component of the Pesticide Technician Program (PTP). At the beginning of each section you are provided with a set of Learning Objectives. Throughout each section, along the left hand page sidebar, there is bolded text that indicates the key knowledge components of the section.

The Training Manual also includes Supplementary Information at the end of some sections. This is for reference purposes only. You will not be examined on this information. However, the Supplementary Information will assist you in obtaining a better understanding of the section. You should retain this Technician Manual as a reference once you become a technician.
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Learning Objectives

After reading and studying this section you should know:
• what is a pesticide
• four main groups of pesticides and the types of pests each group controls
• what is integrated pest management (IPM)
• benefits of proper pest control

What is a pesticide?

A “pesticide” means any organism, substance or thing that is manufactured, represented, sold or used as a means of directly or indirectly controlling, preventing, destroying, mitigating, attracting or repelling any pest or of altering the growth, development or characteristics of any plant life that is not a pest and includes any organism, substance or thing registered under the Pest Control Products Act (Canada).

The general term "pesticide" refers to both conventional (synthetic) and naturally occurring (biochemical) ingredients used to control pests such as insects, weeds or diseases. Pesticides also include plant growth regulators, plant defoliants, plant desiccants and adjuvants.

Products

A homeowner, pet owner, farmer, golf course operator and licensed service provider may use some of the same pesticides. Each product is designed specifically for an intended use. Health Canada assesses all of the ingredients, determines label directions for each product, and registers only those products that present acceptable risk to human health or the environment. O. Regulation 63/09 requires that all persons must follow the federally registered label directions that have been approved by Health Canada.

Pests

Pests, if not properly managed, can affect our quality of life in many different ways. Pests can represent a threat to public health and the environment as well as create significant negative impacts to the economy if they are not efficiently controlled.
The *Pesticides Act* defines a “pest” to mean any injurious, noxious or troublesome plant or animal life other than humans or plant or animal life on or in humans and includes any injurious, noxious or troublesome organic function of a plant or animal.

**The four main groups**

There are many different kinds of pesticides. They can be grouped into four main types according to the specific pests they control:

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<th>Controls</th>
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**IPM**

*Integrated Pest Management (IPM)* is a decision making process where all methods of pest control are considered in order to control the pest. It involves inspection, proper identification of the pest, monitoring the pest, sanitation, establishing thresholds, various control methods including the use of pesticides, and the evaluation of the results of the control methods. If pesticides are to be used, only the least toxic product which gives you effective and practical pest control should be used.

Proper IPM practices will greatly reduce the need for pesticide use.
Benefits of Pesticides

Pesticides are only one of many ways to control pests. When used properly they:

- prevent the spread of pests and disease
- protect the quality of stored food and the integrity of structures
- protect landscape, recreational areas and forests
- allow for the economical production of commodities

Safe Practices and correct use

As a trainee or Technician handling pesticides, you should be knowledgeable about safe practices and correct use in order to prevent harm to yourself, to others and the environment.
After reading and studying this section you should know:

- the main purpose of the key Federal and Provincial laws regarding pesticides
- the Ontario provincial pesticide classification system

The purpose of pesticide law is to ensure the:

a) safe handling and use of pesticides,

b) protection of human health, and

c) protection of the environment.

These laws concern safe use, transportation, proper storage, what to do in the event of a spill, waste pesticide disposal, triple rinsing of empty pesticide containers and empty container recycling. You must obey these laws.

The final authority concerning the interpretation of all legislation rests with the judicial system. The information provided in this manual is for study purposes only. Please refer to the original legislation and the appropriate regulatory authority for specific information.

**Federal Laws**

*Pest Control Products Act (PCP Act)*

The *PCP Act* is the principal federal law that regulates all pesticide products in Canada. This Act is administered by the Pest Management Regulatory Agency (PMRA) of Health Canada. The *PCP Act* establishes the information which must be provided on the pesticide label.

**Main purpose**

The **main purpose of this Act** is to ensure that:

- No person shall manufacture, store, display, distribute or use any pest control product under unsafe conditions.

- No person shall package, label or advertise any pest control product in a manner that is false, misleading or deceptive, or is likely to create a false impression about the pest control product.

- No person shall use, sell, or import into Canada a pest control product unless it is registered.
Federal classification  The federal classification system classifies pesticides as **Domestic, Commercial, Restricted,** or **Manufacturing** depending on the intended use and toxicity. This classification must be shown on the pesticide label. The federal classification scheme and required label information is discussed in detail in the Pesticide Label (Section 4).

All pesticides must be registered under the **PCP Act** by the Pest Management Regulatory Agency (PMRA) before they can be sold or used in Canada. Once a pesticide is registered, it is given a PCP number that is present on the pesticide label.

Provincial Laws  **Pesticides Act and Regulation 63/09**

In Ontario, pesticides are regulated by the **Pesticides Act** and Regulation 63/09. This legislation is administered by the Ontario Ministry of the Environment (MOE). The **Pesticides Act** regulates the sale, use, storage, transport, and disposal of pesticides in Ontario. The **Pesticides Act** and its regulation - Regulation 63/09, can be obtained from Service Ontario or copies can be downloaded from the Internet at: [www.e-laws.gov.on.ca](http://www.e-laws.gov.on.ca). See study section 3, “Requirements of the **Pesticides Act** and Regulation 63/09”, for more detailed information.

Classification of Pesticides in Ontario

In addition to being registered by PMRA, pesticides must also be classified for use in Ontario. The responsibility for Ontario classification of pesticides lies with the MOE. Pesticides are placed into one of eleven classes.

A summary of the Ontario Classes is provided in Table 4.1 of Appendix D. It shows the main criteria of pesticides within each Class and indicates who is allowed to use each Class. **Only certified and/or licensed applicators are allowed to use the more toxic pesticides.**

**Environmental Protection Act**

The purpose of the **Environmental Protection Act** is to protect and conserve the natural environment. This **Act** is administered by the MOE. Provincial Officers are appointed by the Minister to enforce this **Act**. There is also a general prohibition section that makes it an offence to allow any contaminant to cause an adverse effect to the environment.
Part X of the *Environmental Protection Act* is commonly known as the "Spills Bill". It applies to pesticides if they contaminate the natural environment in any way. It is discussed in more detail in the section on Spills. Regulation 347 applies to pesticide container collection sites and deals with the handling and storage of empty pesticide containers for recycling.

**WHMIS - MSDS**

WHMIS stands for Workplace Hazardous Materials Information System. WHMIS gives everyone in the workplace the right to know about the hazards of materials used in the workplace. WHMIS is a national information system intended to protect Canadian workers. It is legislated under the Hazardous Products Act and associated Control Products Regulations. This legislation applies to all of Canada.

WHMIS gives everyone in the workplace the right to know about the hazards of materials used in the workplace. It does this by means of

- cautionary labels on containers of hazardous materials
- separate safety data sheets (MSDS) which provide further detailed information
- worker education on how to use this information

Understanding the provisions of this system is important since there are many other materials in the pest management workplace to which WHMIS legislation applies (e.g. cleaners, solvents, etc.).

For further information regarding WHMIS, visit the Health Canada website at: www.hc-sc.gc.ca/hecs-sesc/whmis or contact the Ontario Ministry of Labour at 1-800-268-8013 or visit their website at: www.labour.gov.on.ca/LAB.

**Material Safety Data Sheets may be obtained from the vendor/supplier of the pesticide.**

The *Transportation of Dangerous Goods Act* is administered by Transport Canada and provincial police. It controls the handling and transport of hazardous products including some pesticides.

This Act permits the transport of potentially dangerous goods only by properly trained people. They must use shipping documents, special labels, vehicle placards, and follow certain safety procedures.
Your vendor and / or registrant should be able to inform you if the pesticides that you are using are considered dangerous goods and require documents, labels and placards. This is discussed further in the Section 3.

**Food and Drugs Act**

The *Food and Drugs Act* is administered by Health Canada. This Act protects the health of consumers by preventing the sale of food that contains any harmful or poisonous substance. If a pesticide application will result in pesticide residues in food, the safety of that residue must be proven before the product can be registered under the *PCP Act*.

**Maximum Residue Limit (MRL)**

The PMRA Health Evaluation Division determines the maximum amount of pesticide residue that may safely be contained in our foods. This amount is called the maximum residue limit (MRL). The MRL is measured in parts per million based on the toxicity of the pesticide, its application rate and timing, and the specific crop.

**Municipal Laws**

Municipalities may have by-laws that restrict the location of pest management businesses and / or pesticide storage areas. All applicable building code legislation must be adhered to, particularly regarding flammable liquid and pesticide storage facilities. Municipalities may also enact by-laws to control pesticide use on their own land. Consult your local municipal offices for information concerning relevant legislation.
Section 2.1  How Pesticides Are Regulated

This is a supplementary section for reference only

Learning Objectives

After reading this section you should obtain a better understanding of:

- Health Canada and the Pest Management Regulatory Agency (PMRA) role to prevent unacceptable risks to people and the environment from the use of pesticides
- How pesticides undergo a rigorous PMRA re-evaluation process
- The importance of Material Safety Data Sheets (MSDS)
- How Ontario takes into account the Pest Control Product Act in its classification of pesticides

Product registration

Before a pesticide is registered, the manufacturer (or registrant) must submit data to support the registration and demonstrates that a product can be used safely and effectively when used as directed on the label. The manufacturer must submit scientific data on the chemistry, toxicology, metabolism, residues, environmental impact, risk/benefit and effectiveness of the product to the PMRA.

The PMRA analyzes and assess the data submitted. They must be sure that the product will not be harmful to non-target plants, animals or the public health and the environment. The PMRA is responsible for assessing the toxicity of pesticides. They determine what precautionary statements and hazard symbols must appear on the label.

Prior to importation, sale or use in Canada, all pesticides must be registered under the federal Pest Control Products Act (PCP Act) and Regulations, administered by Health Canada's Pest Management Regulatory Agency (PMRA). The primary objective is to prevent unacceptable risks to people and the environment from the use of pesticides. To accomplish this, Health Canada evaluates all pesticides before they are registered to ensure that they meet the latest health and safety standards, and that the pesticide works as claimed. The pesticide label specifies how to use the product safely and effectively.
Re-evaluation of registered pesticides

All pesticides registered in Canada are subject to re-evaluation every 15 years or sooner if warranted, to ensure that they meet Canada’s stringent health and environmental protection standards. Federal legislation of pesticides allows the PMRA to re-evaluate a registered product if any new information (e.g., efficacy, environmental effects or human health effects) becomes available, or if the manufacturer asks for a new use to be added to the label.

The PMRA reviews registered products according to the current information. They may decide that the product should be used in a different way or that additional precautions must be included on the label. They may even suspend or cancel a product.

When a product is suspended, any packages already at retail outlets may be sold, but the registrant may not distribute any more of the product. When a product is cancelled, the product may not be sold even if it is already at retail outlets. In some cases, the product may be recalled. The registrant may appeal any decision or change in the registration of the product or may choose to remove the product voluntarily.

Where to get label and pesticide information

The first place to look for information about a pesticide is the product label. The labels of all registered pesticides in Canada are listed for viewing and printing at the PMRA internet website at:

http://eddenet.pmra-arla.gc.ca/

The federal government also provides a pest management information service on pesticides at:

1-800-267-6315

Material Safety Data Sheet (MSDS)

The second place to look for information about a pesticide is the Material Safety Data Sheet (MSDS). Under the Pest Control Product Act MSDS are required for all Commercial, Restricted and Manufacturing Class pesticides. MSDS are part of the national Workplace Hazardous Materials Information System (WHMIS) designed to protect Canadian workers.

The MSDS is divided into thirteen sections that covers the following safety topics:

- Product and Company Identification
  (This section lists the trade name, PCP ACT registration number, and primary use of the product.
It gives the name, address and emergency telephone number of the registrant.)

- Hazards Identification
- Ingredient Information
- First Aid Measures
- Fire Fighting Measures
- Accidental Release Measures
- Handling and Storage
- Exposure Controls / Personal Protection
- Physical & Chemical Properties
- Stability and Reactivity
- Toxicological Information
- Ecological Information
- Disposal Considerations
- Transportation Information
- Regulatory Information
- Other Information

MSDS are available from pesticide suppliers. They are commonly posted by most companies online. MSDS are updated at least once every three years.

You should know the office or warehouse location where your employer and supervising exterminator maintains a copy of pesticide labels along with their associated MSDS.

**Maximum Residual Limit (MRL’s)**

The PMRA sets limits (maximum residue limits) on the time periods when pesticides may be applied to the crop. For example, they are responsible for statements on the label such as, "Do not apply within 10 days of harvest (pre-harvest interval)" to ensure that MRL’s are not exceeded. The Food Directorate also sets restrictions for feeding crop refuse to livestock. The applicator is responsible to make sure pesticides are properly applied and that the MRL is not exceeded.

If you ignore the pre-harvest interval restrictions on the label you are breaking the law. You may face a fine or jail sentence under the *Food and Drug Act* if illegal residues are found.
### Additional Legislation Governing the Use of Pesticides in Ontario

| **Fishing Act** | The *Fisheries Act*, administered by Fisheries and Oceans Canada and Ontario Ministry of Natural Resources prevents anyone from placing harmful substances in water which cause or are likely to cause adverse effects to fish including their spawning grounds, nursing and rearing areas, food supply and migration routes. |
| **Migratory Birds Convention Act** | The *Migratory Birds Convention Act*, administered by Environment Canada, prevents anyone from placing harmful substances in water, or any area frequented by waterfowl and migratory birds. |
| **Canadian Environmental Protection Act (CEPA)** | *Canadian Environmental Protection Act (CEPA)* is administered by Environment Canada, protects the environment as well as human health. The Act covers many different areas including ozone depleting chemicals, export and import controls and clean-ups. |
| **Endangered Species Act** | *Endangered Species Act* is enforced by the Ministry of Natural Resources, protects animals that are listed as endangered (e.g., Peregrine Falcons). |
| **Pesticide Classification Guide for Ontario** | The Ontario classification system takes into account the Federal Class designation of the product under the *Pest Control Products Act* (PCPA), the Hazard Criteria, and its use. See Ontario Classification Guideline Table next page. |
**PESTICIDE CLASSIFICATION GUIDELINE FOR ONTARIO**

### 3. CLASSIFICATION OF PESTICIDES

The classification system will consider the Federal Class designation of the product under the *Pest Control Products Act* (PCPA), the Hazard Criteria, and its use. The pesticides that are ingredients in pesticide products are also classified under the classification system. Section 4(5) of the Regulation sets out eleven possible classifications for pesticides in the Table to that section as follows:

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<th>Column 2</th>
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<td></td>
<td>Classification</td>
</tr>
<tr>
<td>1.</td>
<td>The pesticide is designated under the <em>Pest Control Products Act</em> (Canada) as a pesticide of the Manufacturing class.</td>
<td>Class 1</td>
</tr>
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</table>
| 2.       | 1. The pesticide is designated under the *Pest Control Products Act* (Canada) as a pesticide of the Commercial or Restricted class.  
2. The pesticide meets the description of Very Hazardous in the Guideline mentioned in subsection 4(5).  
3. The pesticide does not meet the description of a Controlled Sales pesticide in the Guideline mentioned in subsection 4(5). | Class 2 |
| 3.       | 1. The pesticide is designated under the *Pest Control Products Act* (Canada) as a pesticide of the Commercial or Restricted class.  
2. The pesticide meets the description of Moderately Hazardous in the Guideline mentioned in subsection 4(5).  
3. The pesticide does not meet the description of a Controlled Sales pesticide in the Guideline mentioned in subsection 4(5). | Class 3 |
| 4.       | 1. The pesticide is designated under the *Pest Control Products Act* (Canada) as a pesticide of the Commercial or Restricted class.  
2. The pesticide meets the description of Less or Least Hazardous in the Guideline mentioned in subsection 4(5).  
3. The pesticide does not meet the description of a Controlled Sales pesticide set out in the Guideline mentioned in subsection 4(5). | Class 4 |
| 5.       | 1. The pesticide is:  
i designated under the *Pest Control Products Act* (Canada) as a pesticide of the Domestic class and meets the description of Less Hazardous in the Guideline mentioned in subsection 4(5), or  
ii. registered under the *Fertilizers Act* (Canada) and the size of its container is greater than 1 kilogram or 1 litre.  
2. If the pesticide may be used in, on or over land,  
i. the only pesticide ingredient it contains is a Class 11 pesticide, or  
ii. every use set out on the pesticide’s label is a use mentioned in subsection 7.1 (2) of the Act. | Class 5 |
<table>
<thead>
<tr>
<th>Item</th>
<th>Criteria</th>
<th>Classification</th>
</tr>
</thead>
</table>
| 6.   | 1. The pesticide is:  
   i. designated under the *Pest Control Products Act* (Canada) as a pesticide of the Domestic class and meets the description of Least Hazardous in the Guideline mentioned in subsection 4(5), or  
   ii. registered under the *Fertilizers Act* (Canada) and the size of its container is less than or equal to 1 kilogram or 1 litre.  
2. If the pesticide may be used in, on or over land,  
   i. the only pesticide ingredient it contains is a Class 11 pesticide, or  
   ii. every use set out on the pesticide’s label is a use mentioned in subsection 7.1 (2) of the Act. | Class 6 |
| 7.   | 1. The pesticide is designated under the *Pest Control Products Act* (Canada) as a pesticide of the Domestic or Restricted class.  
2. The pesticide may be used in, on or over land.  
3. The pesticide meets the description of a Controlled Sales pesticide set out in the Guideline mentioned in subsection 4(5). | Class 7 |
| 8.   | 1. The pesticide is designated under the *Pest Control Products Act* (Canada) as a pesticide of the Domestic class or is registered under the *Fertilizers Act* (Canada).  
2. The pesticide may be used in, on or over land.  
3. The pesticide contains a Class 9 pesticide.  
4. The pesticide meets one of the following descriptions:  
   i. Its label does not set out any of the uses mentioned in subsection 7.1 (2) of the Act.  
   ii. If its label sets out a use mentioned in paragraph 4 of subsection 7.1 (2) of the Act, the pesticide does not meet the description of a Controlled Sales pesticide set out in the Guideline mentioned in subsection 4(5). | Class 8 |
| 9.   | 1. The pesticide is an ingredient in a Class 2, 3, 4, 5, 6, 7 or 8 pesticide.  
2. The label of the Class 2, 3, 4, 5, 6, 7 or 8 pesticide sets out at least one use that is not a use mentioned in subsection 7.1 (2) of the Act.  
3. The pesticide does not meet the description of a Category I pesticide in the Guideline mentioned in subsection 4(5). | Class 9 |
| 10.  | 1. The pesticide is a Class 9 pesticide.  
2. The pesticide meets the description of Category II pesticide in the Guideline mentioned in subsection 4(5). | Class 10 |
| 11.  | 1. The pesticide is an ingredient in a Class 2, 3, 4, 5, 6 or 7 pesticide.  
2. The pesticide meets the description of a Category I in the Guideline mentioned in subsection 4(5). | Class 11 |
Learning Objectives

After reading and studying this section you should know:

- the five (5) requirements of the Prohibitions section of the Pesticides Act (Act)
- the role and the powers of a Provincial Officer
- the significance of Stop and Control Orders and why one would be issued
- the penalties for a violation under the Act and regulations
- requirements for technicians
- the requirements for public notification signs when using a pesticide
- the requirements for proper and safe transportation of pesticides in a vehicle

3.1 Pesticides Act
Prohibitions

Any person responsible for a pesticide shall not allow it to:

- cause damage to the environment, property, plant or animal life
- cause harm or material discomfort to any person
- adversely affect the health of any person
- impair the safety of any person
- make any plant or animal life unfit for use

Effects resulting from the proper legal use of a pesticide are permitted. The prohibition section of the Act protects people, plants, animal life and the environment in general from the misuse of pesticides.

Provincial Officers

Provincial Officers are appointed by the Minister of the Environment to enforce the Act. The Regional Pesticide Specialists (i.e. Provincial Officers) are an important resource to be contacted to answer your questions. They may be contacted through your regional office of the MOE (See Appendix A).

Provincial Officers have powers to enforce the Pesticides Act and Regulation 63/09. Provincial Officers have also the power to investigate pesticide use including the right to inspect premises, stop and inspect vehicles or vessels, take samples, and seize records, equipment and pesticides.
Provincial Officer order

A Provincial Officer may issue a Provincial Officer order to any person that the provincial officer reasonably believes is contravening or has contravened the Act or the regulations, a term or condition of a licence, or permit issued under the Act.

Stop order

A stop order is issued when an emergency exists and where immediate action to stop all activities involved in the use or handling of a pesticide is deemed necessary.

The stop order may be made by the Director under the Pesticides Act or a Provincial Officer. It may be oral or written. It is effective immediately.

The stop order may be appealed immediately, in person or by an agent, and by telephone or otherwise, to the Director under the Pesticides Act.

Control order

Control orders are used when immediate action is not called for but conditions exist that may lead to harm or damage. Control orders are issued in writing by the Director under the Pesticides Act.

Penalty to a person

A person convicted of an offence under the Pesticides Act or Regulation 63/09 could be charged with a monetary fine of up to $20,000 per day for a first conviction and $50,000 on each subsequent conviction and/or up to one year in jail.

3.2 Regulation 63/09 under the Pesticides Act

Unlicensed assistant that is a trainee

Unlicensed assistants are required to be trained in basic health and safety practices before using pesticides. A person who is hired as an assistant to a licensed exterminator and has not completed a course approved by MOE is described as a trainee. A trainee requires direct supervision at all times.

Unlicensed assistant that is a technician

A trainee who has successfully completed a course approved by the Director under the Act (i.e., the academic and the practical training) is referred to as a technician. The status of a Technician is valid for two years (dated from completion of the academic portion of the course). A technician is supervised directly and / or indirectly by a licensed land, structural or water exterminator and has specific restrictions on duties (based on the Class of pesticide he/she uses).
Table 3 (a) on page 4, outlines the conditions under which technicians may work, what they may and may not do, and the supervision requirements.

A supervising licensed exterminator is responsible to ensure that the trainee or technician has received proper training (e.g. Technician Certificate Of Competency and Limitation document, and has acquired the necessary practical skills to safely perform exterminations in compliance with Regulation 63/09.

**Note:*** Licensed Operators or persons who employ a trainee or a technician, supervising licensed exterminators and technicians and trainees are all responsible for applications and misapplications of pesticides and are liable under the *Pesticides Act* and Regulation 63/09.

<table>
<thead>
<tr>
<th>Number of trainees and or technicians a licensed exterminator may supervise</th>
<th>A supervising licensed exterminator may supervise up to three (3) unlicensed assistants (trainees and/or technicians) at one time with the following exceptions:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) If a licensed exterminator is training a group of technicians or trainees who are working at one or more extermination sites as part of their training and none of the exterminations in which they take part is performed for payment.</td>
</tr>
<tr>
<td></td>
<td>If the supervising licensed exterminator holds a Mosquito/Biting Flies licence he or she may supervise up to seven (7) technicians or trainees who are working at water extermination sites to control mosquito larvae and each extermination is performed pursuant to a permit authorizing the prevention or control of mosquito-borne disease</td>
</tr>
</tbody>
</table>

**Trainee Requires Identification**

A trainee must have readily available at the extermination site a document supplied by his or her employer confirming that the trainee works for the employer as a trainee.
Table 3(a): Unlicensed Assistant That Is a Technician

<table>
<thead>
<tr>
<th>What a Technician can do</th>
<th>What a Technician can NOT do</th>
<th>What a Technician must do</th>
<th>What the supervising licensed exterminator must do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mix, load, and apply Class 4, 5, 6 or 7 pesticides.</td>
<td>Select or recommend to a person a pesticide for use in an extermination.</td>
<td>Have readily available at the extermination site his or her technician identification card (TIC) plus written instructions respecting the extermination that includes the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The location of the extermination site.</td>
<td>Provide his/her name to the technician as the person responsible for supervising the technician.</td>
</tr>
<tr>
<td>Mix, load, apply Class 3 pesticides that are NOT avicides, rodenticides, fumigants or suspensions in air</td>
<td>Select the method of application or the rate of application of a pesticide used in an extermination.</td>
<td>• The pest to be exterminated.</td>
<td>Visit the Job site at least once per week when pesticides are being applied to observe the technician’s pesticide applications and to document this visit.</td>
</tr>
<tr>
<td>Mix, load, and apply Class 3 pesticides that are NOT avicides, rodenticides, fumigants or suspensions in air unless DIRECTLY supervised by a licensed exterminator.</td>
<td>Use a Class 3 pesticide that is an avicide, rodenticide, fumigant or suspension in air, <strong>unless in the presence</strong> of a licensed exterminator authorized to use the pesticide.</td>
<td>• The name of the pesticide to be used and its PCP Act or Fertilizers Act registration number #.</td>
<td>Sign and record his/her licence number on the written instructions provided to the technician.</td>
</tr>
<tr>
<td></td>
<td>Use a Class 2 pesticide.</td>
<td>• The name and licence # of the supervising exterminator.</td>
<td>Ensure that the technician has received the necessary training for the specific work that will be performed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A unique # or other identifier by which the extermination is identified in the business records of the employer.</td>
<td>Ensure the technician carries out exterminations in accordance with the Pesticides Act and its regulation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• When visited by a supervising licensed exterminator at the extermination site, the technician must request that the supervising licensed exterminator enter his or her licence #, signature and the date on the written instructions or in a log book.</td>
<td>Ensure that all required public notification is provided.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The technician must carry or have readily available at every extermination site all written instructions signed by a supervising licensed exterminator for the last 30 days (i.e. in a log book).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• When performing public works exterminations the technician must carry a copy of the supervising licensed exterminator’s valid IPM certified status.</td>
<td></td>
</tr>
</tbody>
</table>

Classes of Pesticides under O. Regulation 63/09
Ontario’s classification framework includes eleven (11) classes of pesticides as described in this table.

<table>
<thead>
<tr>
<th>Class</th>
<th>Product Type</th>
<th>Hazard Designation</th>
<th>Technician Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturing Concentrates</td>
<td>Various</td>
<td>Not permitted</td>
</tr>
<tr>
<td>2</td>
<td>Restricted or Commercial</td>
<td>Very Hazardous</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>3</td>
<td>Restricted or Commercial</td>
<td>Moderately Hazardous</td>
<td>Specified Class 3’s used under Direct supervision</td>
</tr>
<tr>
<td>4</td>
<td>Restricted or Commercial</td>
<td>Less and Least Hazardous</td>
<td>Under direct or indirect supervision.</td>
</tr>
<tr>
<td>5</td>
<td>Domestic, greater than 1 L or 1 Kg</td>
<td>Less Hazardous</td>
<td>Under direct or indirect supervision.</td>
</tr>
<tr>
<td>6</td>
<td>Domestic, less than or equal to 1 L or 1 Kg</td>
<td>Least Hazardous</td>
<td>Under direct or indirect supervision.</td>
</tr>
<tr>
<td>7</td>
<td>Domestic or Restricted</td>
<td>Various</td>
<td>Under direct or indirect supervision.</td>
</tr>
<tr>
<td>8</td>
<td>Domestic</td>
<td>N/A</td>
<td>Banned for sale and use</td>
</tr>
<tr>
<td>9</td>
<td>Active ingredients</td>
<td>N/A</td>
<td>Found in Class 2-8 products. Banned for use unless under an exception.</td>
</tr>
<tr>
<td>10</td>
<td>Active ingredients, i.e. glyphosate. Also found in class 9</td>
<td>N/A</td>
<td>Not Permitted.</td>
</tr>
<tr>
<td>11</td>
<td>Active ingredients, Commercial, Restricted and Domestic. Found in biopesticides or lower risk pesticide products</td>
<td>N/A</td>
<td>Found in Class 2-7 products.</td>
</tr>
</tbody>
</table>

The Director under the *Pesticides Act* makes decisions on the classification of all pesticides. Information regarding each classified pesticide product is kept in a record called the Compendium of Classified Pesticides. This information is maintained by the MOE in a database accessible online through the ministry’s web site.

http://app.ene.gov.on.ca/pepsis/

**Cosmetic Pesticide Ban Act, 2008 (CPB Act, 2008)**

The *Cosmetic Pesticide Ban Act, 2008* (CPB Act, 2008), (formerly Bill 64), was passed in the Ontario Legislature on June 18, 2008. The *CPB Act* amends the *Pesticides Act* to prohibit the use and sale of pesticides that may be used for “cosmetic”, purposes meaning “non essential” purposes. This law gave the Ontario government the legislative power to amend the *Pesticides Act* through the regulations, (O. Reg. 63/09), as approved by Cabinet in Council, signed by
the Lieutenant Governor, and published in the Gazette to come into effect.
The CPB Act 2008 allows Cabinet in Council to amend the regulations under the Pesticides Act and to prohibit the use and sale of pesticides for cosmetic purposes pursuant to section 7.1 (1), along with listed exceptions set out under section 7.1 (2) In addition, municipal by-laws were made inoperative if the by-law addresses the use, sale, offer, or transfer of pesticides under section 7.1 (5).

The MOE has provincial jurisdiction over the sale and use of pesticides that are registered under the federal Pest Control Product Act. (PCP Act) in Ontario subject to label restrictions. The current Ontario pesticide ban is part of the government’s toxics reduction plan.

**Banned or restricted pesticides**

Class 9 pesticide active ingredients may not be used for cosmetic purposes (O. Reg.63/09 section 16). Domestic products which contain these pesticide active ingredients are banned for sale and use under subsection 7.1 (1) of the Pesticides Act.

**Exceptions to the ban**

There are exceptions for certain uses under the cosmetic pesticide ban, specifically:

a) Agriculture
b) Forestry
c) Golf courses
d) The promotion of public health or safety
e) Other uses identified by the regulation

- Trees/Arboriculture;
- To protect or manage Natural Resources including control of invasive species;
- In order to comply with other legislative requirements; federal or provincial;
- Maintaining specified sports fields for national or international events, with Minister approval;
- Uses integral to a structural extermination; and
- Maintaining specialty turf used for lawn bowling, cricket, lawn tennis, or croquet if the specialty turf is the same kind of turf that is used on golf course greens.
f) Any person may use Class 5, 6 or 7 herbicides to destroy, prevent or control plants that are poisonous to humans by touch, including poison ivy, poison sumac and giant hogweed on land that he or she owns or occupies. (section 22). Licensed exterminators may use pesticides containing Class 10 ingredients to control plants poisonous to the touch on property which is not their own (section 22).

g) Pesticides otherwise banned for use are allowed to be used to maintain safe conditions and emergency access to public works, which include highways, railways, power works, gas works, and other utilities (section 24).

h) Under subsection 7.1(2) of the Act, other prescribed uses that are excepted from the ban are outlined.

Poisonous plants

Only an appropriately licensed exterminator is authorized to perform a land extermination to destroy, prevent or control plants that are poisonous to humans by touch using a class 9 pesticide. The licensed exterminator may use a Class 5, 6 or 7 herbicide or a Class 2, 3 and 4 herbicide whose only pesticide ingredient is a Class 10 pesticide (s. 22).

Exterminations that technicians are not permitted to perform

A technician may not apply a herbicide to destroy, prevent or control plants that are poisonous to humans by touch, including poison ivy, poison sumac and giant hogweed.

The regulation provides exceptions which allow exterminations using pesticide products with Class 9 pesticide ingredients on specified sports fields, scientific purposes and natural resources. A technician, however, is not permitted to perform exterminations under these exceptions.

Golf courses must undergo formal IPM accreditation to use Class 9 pesticides

In order to apply Class 9 pesticide ingredients on a golf course, the golf course (business-owner, operator or golf course superintendent) is required to register and also undergo a formal legislated IPM Accreditation process through an integrated pest management (IPM) body approved by the Director.

Golf course Class 9 use restrictions

Application of Class 9 pesticide ingredients are restricted to areas used or intended to be used as playing surfaces in the game of golf, including tees, fairways, greens and
Service providers

As of April 22/2010, licensed exterminators performing exterminations for health or safety on public works or specialty turf need to be IPM Certified by an integrated pest management (IPM) body approved by the Director.

No person shall use a Class 9 pesticide at a public work or on specialty turf unless that person is a licensed exterminator whose licence authorizes the performance of the extermination and who is IPM certified for the purposes of section 24, 25, 26 by an IPM body approved by the Director.

When a technician must carry copy of the IPM certificate

Under O. Regulation 63/09, section 24 (4), if the licensed exterminator, who’s licence authorizes the extermination is not present during the performance of an extermination, the person (i.e. technician) must carry or have readily available at the extermination site a copy of the IPM certified certificate from their supervising licensed exterminator.

Daily written instructions

The technician must have readily available at the extermination site a work order, invoice, job sheet, or other form of written instructions respecting the extermination that includes the following:

i. the location of the extermination site
ii. the pest to be exterminated
iii. the name of the pesticide to be used and its registration number assigned to it under the Pest Control Products Act (Canada) or the Fertilizers Act (Canada)
iv. the name and licence number of the supervising licensed exterminator
v. a unique number (e.g. work order or invoice number) or other identifier by which the extermination is identified in the business records of the supervisee’s employer

A technician must carry or have readily available at any extermination site all written instructions signed by a supervising licensed exterminator (during the weekly site visits, when pesticides have been applied) for the last 30 days (e.g. the technician log book or invoices)

Records of supervision

A technician logbook may be used to record applicable weekly site visits by your supervising exterminator to meet regulatory requirements.
<table>
<thead>
<tr>
<th>Fire or other occurrence</th>
<th>In the case of a fire, spill, or theft, the Director must be notified by contacting The Spills Action Centre (1-800-268-6060)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire department notification</td>
<td>A manufacturer, vendor, operator who stores pesticides or any person who stores a class 1 pesticide must provide notification annually to the fire department regarding their pesticide storage.</td>
</tr>
<tr>
<td>Empty containers</td>
<td>An empty metal, plastic or glass pesticide container must be promptly triple rinsed or jet rinsed before taking them to a pesticide container depot. Rinsate should be added into the spray tank for use in the extermination.</td>
</tr>
<tr>
<td>Technician signage responsibilities</td>
<td>The technician has the responsibility to know what signs to post and when and where to post; whether a residential or non-residential sign must be posted and whether a green notice sign or a red warning sign must be posted. The technician must know when to post signs immediately before the extermination begins and when signs must be posted 24 hours in advance of the extermination. Signs must be removed no sooner than 48 hours after the completion of the extermination. Signs must be removed no later than 10 days after the completion of the extermination. Information on pesticide WARNING and NOTICE signs are available on the MOE website at: <a href="http://www.ene.gov.on.ca">www.ene.gov.on.ca</a> or at <a href="http://www.ene.gov.on.ca/en/land/pesticides/signs.pdf">http://www.ene.gov.on.ca/en/land/pesticides/signs.pdf</a>. Technicians must know the posting requirements found in sections 74 – 81 of O. Regulation 63/09 (described in Appendix E). Copies of the notification requirements may be requested by mail by contacting your local MOE office; alternatively, you may ask your supervising licensed exterminator for this information. It is a responsibility of the supervising licensed exterminator to make certain that the appropriate pesticide signs are provided to the technician.</td>
</tr>
</tbody>
</table>
Section 4  Pesticide Label

Learning Objectives

After reading and studying this section you should know:
- that the label is a legal document under the Pest Control Products Act (PCP Act)
- that a label includes a principal and secondary panel and often booklets, tags etc.
- the importance of reading the label before using a pesticide and understanding the information that the label provides
- what information must be provided to medical authorities in event of an accidental poisoning

Legal status

A pesticide label is a legal document under the PCP Act with specific requirements for wording, required information, and the location of this information on the label. It is against the law to make a recommendation or use a pesticide product that is not in accordance with the uses, restrictions and instructions on the label.

Technicians cannot make pesticide recommendations

Importance of reading the label

A pesticide label informs you of the following important information:
- what chemicals or active ingredients (a.i.) are in the pesticide product
- the associated hazards of the product, precautionary measures and protective equipment required
- the pests to be controlled
- the application rates
- how to use the product safely and user restrictions
- what to do in case of an accident (i.e. spill, poisoning)

Always read the label before you buy, use, store or dispose of a pesticide.

In the event of an accidental pesticide poisoning immediately provide medical authorities with the name of the pesticide product and Pesticide Control Product (PCP) REGISTRATION NUMBER XXXXX found on the principal display (front of the) label. Always follow the practical first aid measures outlined on the pesticide product’s secondary label under FIRST AID in case of poisoning or injury.
ON ALL PESTICIDE LABELS YOU WILL FIND PRECAUTIONARY SYMBOLS AND SIGNAL WORDS.

LABEL PRECAUTIONARY SYMBOLS AND SIGNAL WORDS

<table>
<thead>
<tr>
<th>POISON</th>
<th>CORROSIVE</th>
<th>FLAMMABLE</th>
<th>EXPLOSIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Poison Symbol" /></td>
<td><img src="image2" alt="Corrosive Symbol" /></td>
<td><img src="image3" alt="Flammable Symbol" /></td>
<td><img src="image4" alt="Explosive Symbol" /></td>
</tr>
</tbody>
</table>

One of the above hazard PRECAUTIONARY symbols will always appear inside one of the following shapes with its capitalized signal word whenever applicable. Where more than one precautionary hazard symbol could be used only the most dangerous shape and signal word is required PLUS all the applicable above hazard-identifying CAPITALIZED words.

![Triangle](image5) means low hazard
some danger

![Diamond](image6) means moderately hazardous
more dangerous

![Octagon](image7) means high hazard
most dangerous

Pesticide products with EYE and/or SKIN hazard properties will also state the CAPITALIZED signal words below.

<table>
<thead>
<tr>
<th>CAUTION - EYE IRRITANT</th>
<th>WARNING - EYE IRRITANT</th>
<th>DANGER - CORROSIVE TO EYES</th>
</tr>
</thead>
<tbody>
<tr>
<td>if mildly irritating</td>
<td>if moderately irritating</td>
<td>if severely irritating</td>
</tr>
<tr>
<td><strong>CAUTION - SKIN IRRITANT</strong></td>
<td><strong>WARNING - SKIN IRRITANT</strong></td>
<td><strong>DANGER - SKIN IRRITANT</strong></td>
</tr>
<tr>
<td>mildly irritating</td>
<td>moderately irritating</td>
<td>severely irritating</td>
</tr>
</tbody>
</table>
Commercial Principal Display Panel Mandatory Information

1. **Product Name** - specific to the product (e.g., brand/trade name,) and is descriptive of its physical form (formulation) and purpose (description of use e.g., insecticide, herbicide)

2. **FEDERAL CLASSIFICATION** - who may use the product (e.g., Domestic, Commercial, Restricted)

3. **Precautionary Symbols and WORDS** - the sample label below indicates that the product is moderately hazardous with skin and eye irritant properties and is a poison

4. **READ THE LABEL** (if applicable must insert-“AND ATTACHED BROCHURE” or the word “LEAFLET”) **BEFORE USING**

5. **REGISTRATION NO. XXXXX PEST CONTROL PRODUCTS ACT** (commonly known as the P.C.P. #) states the approved product’s registration number. The registration number is provided by the Pest Management Regulatory Agency (PMRA) of Health Canada

6. **GUARANTEE** states the name of the active ingredient of the chemical found in the pesticide product

7. **Name And Postal Address of the Registrant** of the product

8. **Net Contents** – how much pesticide product by weight or volume is found in the package

---

**CONTROLAL-DT™ 400 EC**

- Emulsifiable Concentrate
- Herbicide
- COMMERCIAL
- WARNING

For use by Licensed Pest Control Operators; not for sale to the public (exists only on primary label when such user restriction is applicable)

**EYE AND SKIN IRRITANT**

**POISON**

**READ THE LABEL AND ATTACHED LEAFLET BEFORE USING**

**REGISTRATION NO. XXXXX PEST CONTROL PRODUCTS ACT**

**GUARANTEE:** Pesticide X ...380g/L

**Distributor:**

**Registered by:**

**COMPANY NAME**

**Company Name**

**Postal Address**

**Postal Address**

**Net:** 10L
### DIRECTIONS FOR USE OF THIS PRODUCT:
The product **CONTROLAL-DT** is an emulsifiable concentrate herbicide for use to control broadleaf weeds in grasses. **TURFGRASS:** Apply 1.25 L/ha after second cutting of newly seeded lawns. Apply in 450-900 L of water per hectare. Do not apply if temperature is above 25°C. Do not apply near ornamentals. Do not apply to Bentgrass. Do not tank mix this product with any other product.

### PRECAUTIONS:
**KEEP OUT OF REACH OF CHILDREN.** Harmful if swallowed, inhaled or absorbed through the skin. Avoid breathing vapour or spray mist. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling and before eating, drinking and smoking. Do not store near feed or foodstuffs. Do not allow people or pets to contact treated area until spray has dried completely. Applicators must wear protective clothing inclusive of hand, foot and eye covering. CSA approved respirator must be used when applying **CONTROLAL-DT.**

### ENVIRONMENTAL HAZARDS:
Do not allow spray to contact susceptible plants. Coarse sprays are less likely to drift. Avoid contamination of food for human consumption or livestock feed. Do not contaminate water through spray or drift from the target area.

### STORAGE AND DISPOSAL
**Pesticide Storage:** Avoid freezing. If subjected to freezing temperatures, warm to at least 5°C for 24-48 hours and mix thoroughly until crystals dissolve and product appears uniform before using.

**Disposal:** Do not contaminate water, food or feed by storage or disposal.

1. Thoroughly empty contents of the container into application equipment.
2. Make the empty container unsuitable for further use.
3. Dispose of the container in accordance with provincial requirements.
4. For information on the disposal of unused, unwanted product and the cleanup of spills, contact the Provincial Regulatory Agency or the manufacturer.

### FIRST AID:
**DANGER –** This product contains a petroleum distillate. If swallowed do not induce vomiting. Get medical attention or call poison control centre immediately and take product label with you. If patient is conscious give him air. If on skin, wash with soap and remove contaminated clothing. If splashed in eyes, flush with plenty of water for 15 minutes and contact a physician immediately. If inhaled, remove victim to fresh air, apply respiration if required and seek medical attention immediately.

### TOXICOLOGICAL INFORMATION:
This product contains petroleum distillate and is a cholinesterase inhibitor. Symptoms include nausea, vomiting, pinpoint pupils, convulsions and coma. **ATROPINE only by injection is the preferable antidote.** Give 2 to 4 mg of atropine sulphate intramuscularly or intravenously immediately and every hour as required until pupils dilate. Treat symptomatically for ingestion and/or skin and eye contact.

### NOTICE TO USER:
This control product is to be used only in accordance with the directions on this label. It is an offence under the Pest Control Products Act to use a control product under unsafe conditions.

### NATURE OF RESTRICTION:
This product is to be used only in the manner authorized, consult local pesticide regulatory authorities about use permits which may be required.

### NOTICE TO BUYER:
Seller's guarantee shall be limited to the terms set out on the label and, subject thereto, the buyer assumes the risk to persons or property arising from the use or handling of this product and accepts the product on that condition.

### FOR EMERGENCY ASSISTANCE
CALL 1-800-XXX-XXXX
① DIRECTIONS FOR USE
This section must include complete information on application rates, directions for use, and use limitations with common names of the pests. If space is insufficient, a leaflet or booklet can be added as part of the label.

The following are examples of the kind of product information that may be found:

- what pests it can be used for to control (e.g., weeds, insects or diseases)
- mixing instructions and mandatory protective clothing/equipment requirements
- how, when, where, how often, and rates for use and application of the product
- recommended conditions for application (e.g., weather, growth stage of the plant or insect)
- how close to time of harvest after applying a pesticide one can safely harvest vegetables/crops (e.g., pre-harvest interval, days to harvest)
- re-entry period (e.g., length of time people must stay out)
- any other pertinent information

② PRECAUTIONS
This section outlines any significant risks relating to handling, storage, display or distribution of product. Included are instructions on how to reduce risk such as what personal protection equipment (PPE) to wear, and where necessary, on decontamination. Any significant hazard relating to human health is also detailed on this panel, along with instructions on how to alleviate such hazards. This section also includes the child hazard warning "KEEP OUT OF REACH OF CHILDREN". An exception is “DOMESTIC” products where the child hazard warning must appear on the principal display panel.

③ ENVIRONMENTAL HAZARDS
This section outlines any significant hazard relating to wildlife and the environment along with instructions on how to alleviate such hazards.

④ STORAGE AND DISPOSAL
This section informs the user as to their responsibilities in proper storage and disposal of containers, and information on the disposal of unused and unwanted product and cleanup of spills. All tank rinsing (i.e., rinsate) should be returned to the spray tank to be used at the target site. See sample label display panel for details.

Returnable-refillable containers must use the following wording: “After use, return the container to point of purchase or designated locations. This container must only be refilled with the same “Product Trade Name” as it originally contained. Do not reuse container for any other purpose. Prior to refilling, inspect thoroughly for damage, such as cracks, punctures, abrasions, and damaged or worn out threads on closing devices. Check for leaks after refilling and before transportation. Do not refill or transport damaged or leaking containers.”
**FIRST AID**

This section outlines the practical measures to be taken in event of poisoning, intoxication or injury caused by the product. This section describes measures that can be safely implemented in the event of a poisoning or injury caused by the pesticide prior to obtaining medical assistance. If medical attention is recommended under the first aid section the following statement is usually added, “Take container, label or product name and Pest Control Product Registration Number with you when seeking medical attention.” This information should be readily available in case medical aid is necessary.

**TOXICOLOGICAL INFORMATION**

This subsection provides all available information that is essential to medical treatment of persons who have been poisoned. It is directed towards medical professionals. Included is information on symptoms of poisoning or intoxication, antidote or remedial measures, identity of any ingredients in the product, such as a petroleum distillate, that may affect treatment. The following types of products must carry label toxicological information:

- all products with the DANGER signal word as a result of systemic toxicity or eyes and skin effects;
- any products that produce physiological effects requiring specific antidotes or medical treatment, such as cholinesterase inhibitors, metabolic stimulants, anticoagulants, etc.;
- all products that contain greater than or equal to 10% petroleum distillates.

**NOTICE TO USER**

This section informs the user that the product may only be used in accordance with the label instructions. The CONTROLAL-DT™ sample label wording in the NOTICE TO USE section is applicable for all Commercial, Restricted and Manufacturing class labels. Pesticide products that you can use may also have some RESTRICTED USES for which a permit or licence may be required. Where a product has restricted uses on the label these will appear prominently at the top of the secondary display panel boxed within a dark heavy line stating “NOTICE TO USER” followed by “NATURE OF RESTRICTION” statement followed by “RESTRICTED USES”, and detailed directions.

**NOTICE TO BUYER**

This section states the buyer is responsible for the safe use of the pesticides when a registrant wishes to include a “limitation of warranty statement” as shown in the sample label.
Label Restrictions for Users and/or Uses

A pesticide product that is not federally classified as “RESTRICTED” can still have restricted USES. This RESTRICTED USE information will always be found on the principal display panel. The sample label CONTROLAL-DT™ shows a product that has been restricted by the registrant “For Use Only by Licensed Pest Control Operators; not for sale to the public” so this means that this product is not for homeowner use.

Restricted uses

Certain labels have specific restricted uses. The below example shows how a product may show a Restricted use:

<table>
<thead>
<tr>
<th>NATURE OF RESTRICTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic or Woodland Use. This product is to be used only in the manner authorized, consult local pesticide regulatory authorities about use permits which may be required.</td>
</tr>
</tbody>
</table>

Provincial classification not on label

The provincial classification is not shown on the label. You can find the Ontario Class for a pesticide product on the Ministry website at http://app.ene.gov.on.ca/pepsis/

Keep pesticide product labels in good condition

The product label must be legible to ensure proper use and disposal of a pesticide product. If you can not read any portion of the label, it is your responsibility to request and have your employer or supervising licensed exterminator secure an identical information label to the container. Your supplier can be contacted for a replacement or a photocopy can be made.

Remember, important label information is frequently included in a label’s booklet or leaflet that may not attached to the display panels. Make sure that you are aware of all label information before using any pesticide, to avoid improper pesticide use.

The label will always alert you if there is any added information not on the principal or secondary display panels.

Check the principal panel under the heading “READ THE LABEL BEFORE USE”. If a third part of the label exists it will state “READ THE LABEL AND ATTACHED LEAFLET BEFORE USE”. Remember, the pesticide product’s precautionary symbol(s) and signal word(s) can provide you with an easy reference to understand the hazard ratings of any pesticide product.
Learning Objectives

After reading and studying this section you should know:
- what is a formulation
- the types of formulations
- why pesticides come in different formulations for different uses
- that pesticides contain both active ingredients and inert ingredients

Always read the label to make certain that you understand the proper use of the pesticide you are using. A pesticide that you regularly use but is provided to you in a different formulation can pose different health and environmental concerns. Different formulations often require the use of different application methods and equipment. Your supervising licensed exterminator must ensure that you are trained to use different formulations and applicable application methods and equipment.

What is a formulation?

A pesticide formulation consists of one or more chemicals which are the active ingredients (sometimes abbreviated and referred to as the “a.i.”) in the product plus ingredients which have no pesticidal action. These additional ingredients are called inerts.

A single pesticide may be sold in more than one kind of product formulation (e.g., liquid, granular, dust) and in various concentrations of a.i.. A product formulation is usually developed for a specific market, a specific use, and for intended end users (i.e. commercial applicators).

Formulations are designed for safety, convenience and effectiveness.

Active ingredient

The active ingredient is the part of a pesticide formulation that produces the desired effect on the pest.

Inert ingredient

Inert ingredients are added to the a.i. of a pesticide product to make it suitable for storage, handling or application. Examples of inert ingredients are talc in a dust formulation or a petroleum distillate in an emulsifiable concentrate formulation. Other inert ingredients such as solvents, wetting agents, extenders or emulsifiers may be added when formulating a pesticide product to make it more effective for an end user. Inerts are not listed on the label.
All pesticide formulations can be divided into 3 main types: solids, liquids and gases. Each of these types can be further subdivided into specific formulation types. See this section’s supplemental information for more details.

### Types of formulations

<table>
<thead>
<tr>
<th>SOLIDS</th>
<th>LIQUIDS</th>
<th>GASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dusts or Powders, Granules, Pellets, Tablets, Particulates, Dry Flowables</td>
<td>Suspensions (Flowables), Solutions, Emulsifiable</td>
<td>Fumigants sold as liquids or solids</td>
</tr>
</tbody>
</table>

### Formulation type considerations

All formulations have advantages and disadvantages. For example, granular formulations do not produce spray and vapour drift and can eliminate the need for costly equipment.

### Risks

Granular formulations do not lessen the care that is required by a technician in handling the product or keeping the pesticide product away from non-target areas (e.g., flower beds, driveways, fish ponds and swimming pools). Granular formulations are not free from pesticide risks.

### Disadvantages

Some disadvantages of granular formulations include the risk of pickup by wildlife, if not properly applied. Granular formulations are also generally far more costly to apply and purchase. Commercial pesticide products applied in the liquid form often have a high concentration of a.i. and therefore must be diluted with water or oil before use (e.g., fogging or Vapona injection).

### Pesticide compatibility

Pesticides are considered compatible if they mix well in the spray tank and work effectively together.

Pesticides that are NOT compatible can cause:
- loss of effectiveness
- injury to crops and to other vegetation
- separation of the mixture
## Summary of Common Pesticide Product Formulation Types

<table>
<thead>
<tr>
<th>TYPES</th>
<th>DESCRIPTION</th>
<th>ADVANTAGE</th>
<th>DISADVANTAGE</th>
<th>TYPICAL USE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dry Flowable</strong></td>
<td>A wettable powder formulated into small pellets or granules. Diluted in Water.</td>
<td>Reduces the dust problem with WP formulations. Easier to handle with better dispersal in sprayer.</td>
<td>Needs continuous agitation to remain in suspension. Left overnight will clog the sprayer or tank.</td>
<td>General use.</td>
</tr>
<tr>
<td><strong>Dust or Powder</strong></td>
<td>Finely ground dry material with a low a.i commonly using talc or clay as inert ingredient. No dilution.</td>
<td>Ready to use. Used outdoors and some concealed areas in structures (e.g., attics, wall voids).</td>
<td>Dusty and badly drifts. Limited use indoors. Respirator needed. Highly visible on surfaces.</td>
<td>Spot treatment. Home, lawn, tree, garden products. Animal powders.</td>
</tr>
<tr>
<td><strong>Gel</strong></td>
<td>A pliable mix of low a.i., insect attractants plus inert ingredients in a &quot;gel&quot; bait to control a specific insect.</td>
<td>Ready To use. Sold as pucks or in tubes for professional use. Superior long term control with low a.i.</td>
<td>Absorbs odours that may make product ineffective. May need special injector tube gun.</td>
<td>Bait to control a targeted pest (e.g., ants and roaches).</td>
</tr>
<tr>
<td><strong>Granular</strong></td>
<td>A mix of dry, large, free-flowing particles usually with a low a.i.</td>
<td>Ready To use. Low dust or drift. Usually has longer residual.</td>
<td>Extra care required to ensure product not applied outside target area.</td>
<td>Soil applications Insects/vegetation control (e.g., soil sterilizing, ants).</td>
</tr>
<tr>
<td><strong>Impregnated Fertilizer</strong></td>
<td>A granular fertilizer with a low herbicides or insecticide a.i.</td>
<td>Single application no sprayer needed. Not dusty. Low a.i.</td>
<td>As above</td>
<td>Soil/lawn application.</td>
</tr>
<tr>
<td><strong>Particulate or Bait</strong></td>
<td>Large particles mixed with edible material. Low a.i. concentration.</td>
<td>Ready to use.</td>
<td>Extra caution must be taken to prevent child or pet contact.</td>
<td>Bait for insects or rodents.</td>
</tr>
<tr>
<td><strong>Pellet</strong></td>
<td>Pre-formed mixture of a.i. and inerts to form small pieces.</td>
<td>As above.</td>
<td>As above.</td>
<td>Bait to control rodents, slugs etc.</td>
</tr>
<tr>
<td><strong>Soluble Powder or Granules</strong></td>
<td>A dry material similar to dust or granules except soluble in water.</td>
<td>Packaging easily disposed.</td>
<td>Dusty. Must be kept agitated. Can clog sprayer.</td>
<td>General use.</td>
</tr>
<tr>
<td><strong>Tablet</strong></td>
<td>A pre-formed “tablet” composed of inert a.i.</td>
<td>Easy to measure and use.</td>
<td>Many are restricted products that require a licence.</td>
<td>Fumigant.</td>
</tr>
<tr>
<td><strong>Wettable Powder</strong></td>
<td>a.i. added to a powder (clay, talc) contains a wetting and dispersing agent. Forms a suspension in water.</td>
<td>Low cost. Packaging easier to dispose.</td>
<td>Needs agitation to remain suspended. Dusty. Will usually clog sprayer / tank if left overnight.</td>
<td>General use.</td>
</tr>
<tr>
<td>TYPES</td>
<td>DESCRIPTION</td>
<td>ADVANTAGES</td>
<td>DISADVANTAGE</td>
<td>TYPICAL USE</td>
</tr>
<tr>
<td>--------------------------</td>
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<td>-----------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Aerosol</td>
<td>A liquid with one or more solvents* with low a.i. in a pressurized container.</td>
<td>Ready To use. Relatively safe due to low a.i. concentration.</td>
<td>May be hazardous near flames or if punctured. More costly.</td>
<td>General use for flying insects. Extensively used for all kinds of retail products.</td>
</tr>
<tr>
<td>Emulsifiable Concentrate (EC)</td>
<td>A clear solution with emulsifiers**. Final spray solution has a milky look. Diluted with water.</td>
<td>A high concentration of a.i. that increases depending on the end user to lower costs and storage needs.</td>
<td>Possibly flammable and phytotoxic.</td>
<td>General use. Consumer products are usually restricted to 12.5% a.i.</td>
</tr>
<tr>
<td>Micro-encapsulated Suspension</td>
<td>A suspension with a.i. in microcapsules giving a slow release of a.i.</td>
<td>See E.C. comments. Increases the residual of an a.i. Reduces hazards to operator.</td>
<td>Usually far more costly.</td>
<td>Insecticides.</td>
</tr>
<tr>
<td>Flowable or Suspension</td>
<td>An opaque liquid composed of finely ground particles with a.i. in a liquid. Must be diluted with water.</td>
<td>Available in various a.i. concentration formulations</td>
<td>Needs to be agitated or a.i. may settle out of formulation</td>
<td>General use.</td>
</tr>
<tr>
<td>True Liquid</td>
<td>An a.i. in a fluid form, usually mixed with water / remains clear.</td>
<td>See above. Minimum agitation needed.</td>
<td>Could be corrosive</td>
<td>General use.</td>
</tr>
<tr>
<td>Ultra-Low Volume (ULV) Concentrates</td>
<td>An a.i. solution designed to be used undiluted only in ULV equipment. Very high concentrate of a.i.</td>
<td>Ready to use.</td>
<td>High a.i. application makes them hazardous. Special equipment required.</td>
<td>Insecticide normally used inside structures. May also be used in mosquito and black fly control</td>
</tr>
</tbody>
</table>

**GASES**

| Fumigants | Volatile liquids or solids packaged for release as a gas. | Penetrates cracks and crevices. Toxic to many forms of the pest at one time. | Area must be well sealed. Highly toxic. | Restricted use. |

**NOTE:** ALL Formulations contain ACTIVE ingredients (a.i) and may contain INERT ingredients.

*A Solvent* is a liquid used to dissolve another substance (e.g. water, oils, petroleum distillates)

**An Emulsifier** is an additive that encourages the suspension of one liquid in another, allowing two incompatible chemicals or solvents to mix together.
Adjuvants

The effectiveness of some pesticides may be improved by the addition of adjuvants in the spray tank to the product formulation.

Benefits

An adjuvant is a substance that may be added to a pesticide in a spray tank to improve the effectiveness of the active ingredient in certain applications. One example of a commonly used adjuvant is a surfactant. Surfactants are "surface active agents". They improve the rate at which the pesticide is absorbed by improving the spreading, dispersing and wetting properties of a pesticide mixture.

How adjuvants work

Adjuvants may improve the effectiveness of a pesticide in the following ways:

- **Wetting the surface**: for better adherence to the plant surface.
- **Increasing/decreasing evaporation**: to increase or shorten the drying period after the application.
- **Increasing absorption into the plant**: an important consideration if the pesticide must be taken into the plant to be effective.
- **Making spray droplets more uniform**: to obtain better coverage of the target surface and thereby increase the pesticide effectiveness.

Types of adjuvants

Some types of adjuvants are:

- surfactants
- stickers (increase pesticide adherence on the treated surface)
- thickeners (reduce drift by increasing droplet size)
- anti-foaming agents (reduce foaming of spray mixtures)
- buffers (lower the pH of an alkaline mixture therefore reducing the rate of chemical breakdown)

**CAUTION:**

Use of an adjuvant increases the risk for damages.

Surfactants are adjuvants that improve the rate at which the pesticide is absorbed by improving the spreading, dispersing and wetting properties of a pesticide mixture that are surface active agents.
Wetting agents and spreaders

Wetting Agents and Spreaders are types of surfactants. Wetting Agents allow wettable powders and dry flowable to mix with water and stick on surfaces. Spreaders allow pesticides to form an even coating layer over the treated surface.

Abbreviations

<table>
<thead>
<tr>
<th>Common code abbreviations for formulation types</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU Dust or Powder</td>
</tr>
<tr>
<td>DF Dry Flowable</td>
</tr>
<tr>
<td>DV Device</td>
</tr>
<tr>
<td>EC Emulsifiable Concentrate</td>
</tr>
<tr>
<td>GR Granular</td>
</tr>
<tr>
<td>LI Liquid (100% active)</td>
</tr>
<tr>
<td>LO Live Organism</td>
</tr>
<tr>
<td>MS Microcapsule Suspension</td>
</tr>
<tr>
<td>PA Paste</td>
</tr>
<tr>
<td>PE Pellet</td>
</tr>
<tr>
<td>PP Pressurized Product</td>
</tr>
<tr>
<td>PT Particulate</td>
</tr>
<tr>
<td>SG Soluble Granules</td>
</tr>
<tr>
<td>SN Active Solution</td>
</tr>
<tr>
<td>SP Soluble Powder</td>
</tr>
<tr>
<td>SU Suspension</td>
</tr>
<tr>
<td>TA Tablets</td>
</tr>
<tr>
<td>WD Water Dispersible Granules</td>
</tr>
<tr>
<td>WG Wettable Granules</td>
</tr>
<tr>
<td>WP Wettable Powder</td>
</tr>
</tbody>
</table>

Remember: Not all pesticide manufacturing companies use the same formulation abbreviations. Check the label if you do not understand an abbreviation. The product formulation will always be found and written out in full on the label.

Factors that affect product formulation selection

The type of product formulation that is selected by your supervising licensed exterminator depends on many factors, including:

- chemistry of the active ingredient
- toxicology of the active ingredient
- how well the product controls the pest
- any undesired effects of the product on plants, animals or surfaces
- effect of the product to the environment
- risk to the applicator, public and other organisms
- how the product will be applied and the equipment needed
- availability of safety and application equipment
- cost associated with the application

A licensed exterminator will select the product formulation which will be the most effective with the least negative side effects for the task to be performed.
Learning Objectives

After reading and studying this section you should know:

- the relationship between risk, exposure and toxicity
- the sources of exposure
- the pathways through which pesticides can enter your body (i.e. dermal, oral, ocular, inhalation)
- conditions that increase the rate of pesticide absorption through the skin
- how to prevent exposure through each of the three pathways
- how to manage your risk
- how to recognize signs and symptoms of pesticide poisoning
- that symptoms of pesticide poisoning may occur immediately or not for hours after exposure
- what to do in case of poisoning and then perform appropriate first aid or decontamination
- when you should have a cholinesterase blood test

Risk, exposure and toxicity

Each time an applicator applies a pesticide there is some degree of risk to human health. You should minimize pesticide risks by using proper safety procedures and following label instructions.

The amount of risk depends on two things: the exposure to the pesticide product and its toxicity. **Toxicity** is the measure of how harmful or poisonous a substance is. The greater the exposure, the greater the risk; the greater the toxicity, the greater the risk. The simplest way to reduce risk is to reduce exposure. Risk can be expressed as an equation:

\[
\text{RISK} = \text{EXPOSURE} \times \text{TOXICITY}
\]

Sources of exposure

Exposure to pesticides can occur at any stage of pesticide handling or use, including: transport, storage, mixing and loading, disposal, equipment maintenance, reentry to the application site and cleanup. An applicator may be exposed to pesticides from spills, splashes, vapours, drift, handling contaminated protective equipment or application.
equipment, or the utensils used for mixing. Other areas of exposure can include door knobs, vehicle handles and steering wheels.

**Prolonged exposure to even a low toxicity pesticide can result in poisoning.**

### Three (3) ways pesticides can enter your body

You may be exposed to a pesticide by:

- contact with the skin and eyes (**dermal exposure**)
- swallowing (ingesting) a substance (**oral exposure**)
- breathing in (inhaling) spray mist, dust or vapours (**inhalation exposure**)

### Dermal exposure through skin or eyes

Dermal exposure occurs when a substance comes in contact with skin or eyes. The hands and arms are the most common route of pesticide exposure to applicators. It can occur easily through direct contact with the pesticide concentrate or solution, or with the spray mist during application. Another common cause of exposure is wearing contaminated clothing.

### Conditions that increase exposure

The amount of pesticide taken into the body depends on the condition of your skin, the parts of the body coming into contact with the pesticide and the kind of pesticide product formulation used. Your body will take in pesticides more easily if:

- you have any cuts, scrapes or abrasions on your skin
- your skin is moist or sweaty
- the pesticide remains on your skin for a long time
- certain parts of the body are exposed to pesticides (e.g., armpits, genital area, small of back and head)
- the pesticide is a liquid (more readily absorbed by the body than contact with granular formulated pesticide products)

### Preventing skin absorption

To prevent absorption of pesticides through the skin:

- wear protective clothing, including gloves, when
handling or using pesticides and when repairing equipment contaminated with pesticides

- wash and shower as soon as possible after using pesticides
- wash your hands before eating, drinking or smoking or using the washroom
- if you spill pesticides on your body or clothes, shower and change clothing immediately
- wash clothes used during pesticide application separate from other laundry after each day of spraying

**Absorption through the eyes**

The eyes are a common site of pesticide dermal absorption and special care should be given to protecting your eyes as they absorb pesticides very quickly. Some pesticides may irritate the eyes while others may cause severe damage. Check the label for special precautions for preventing eye exposure.

**Prevent absorption through the eyes**

Always remember to wear goggles when mixing pesticides or loading tanks to protect your eyes from splashes and spills.

**Oral exposure**

Oral exposure occurs when a person swallows a toxic substance or ingests food that has been contaminated by pesticide. This can happen if:

- a pesticide is stored in a food or drink container (a person may eat or drink the pesticide by mistake)
- a pesticide is stored in a container that is not labeled properly
- a person smokes, eats or drinks while handling pesticides (cigarettes and other items in one’s pocket can absorb pesticides)
- a person eats food that has recently been treated with a pesticide

Since the stomach and the intestines absorb chemicals quickly, the poisoning may be very serious with oral exposure.

**Prevent ingestion**

To prevent accidental ingestion of pesticides

- store pesticides in their original containers, away from children or unauthorized persons. Make sure the original label can be read
- never store pesticides in food or drink containers
• wash hands after handling pesticides and before eating, drinking and smoking
• never use your mouth to siphon pesticide liquids or to clean clogged sprayer nozzles
• use a face shield when mixing concentrates

Inhalation exposure

Poisoning can result from pesticides entering the body through the lungs. Once a pesticide is in the lungs, it is absorbed almost completely. There is a greater chance of inhaling pesticides when working in a confined or poorly ventilated area. Always mix and load in a well ventilated area.

Most small particles and spray droplets are too large to enter the lungs directly. However, they will build up in your nose and nasal passages and may eventually enter the body through the saliva in your mouth.

Vapour drift, and spray drift due to small droplet size, present the greatest inhalation hazards and can enter the lungs directly. Inhalation is the biggest danger when applying fumigants.

Prevent inhalation poisoning

To prevent inhalation poisoning:
• wear a respirator when necessary and make sure it is the correct type and that it fits properly, and that the cartridges are still operable
• do not smoke while applying pesticides and do not use contaminated smoking supplies
• do not go back into a treated area or room too soon (Follow the directions on the label or, if no re-entry time is listed, follow the instructions from your supervising exterminator.)

What is toxicity?

Toxicity is the measure of how harmful or poisonous a substance is.

How toxic are pesticides?

Pesticides vary from being slightly toxic to being extremely toxic. Before a pesticide product is approved by Health Canada, it must be tested to determine how dangerous or toxic it is when there is a:
• single dose or exposure, or
• repeated exposures to small doses
Chronic toxicity

Chronic toxicity is the toxic response that results from repeated exposures to small doses of a pesticide over a longer period of time. Symptoms of chronic poisoning may not develop for many days, months or years. The actual toxic effect of a pesticide is different for everyone depending on age, sex, weight, length of exposure, and method of exposure. Chronic effects of pesticide poisoning may include tumors, reduced body weight, neurological dysfunction, skin irritation and many others.

Acute toxicity

Acute toxicity is the toxic response that results from a single dose or exposure to a pesticide. Symptoms of acute toxicity can develop immediately or within a few days. Scientists measure the acute toxicity of a pesticide by determining its 50% lethal dose or LD$_{50}$.

LD$_{50}$

The lethal dose (LD$_{50}$) value is the statistical estimate of a chemical dose which will kill 50% of the test animals within a stated period of time (e.g., 24 hours to seven days). The test animal is usually a rat, mouse or rabbit. LD$_{50}$ values are expressed in milligrams of dose per kilograms of body weight of the test animal.

Oral LD$_{50}$ is the amount of a substance (mg/kg of body weight) which will kill 50% of the test animals when it is ingested orally (swallowed).

Dermal LD$_{50}$ is the amount of a substance (mg/kg of body weight) which will kill 50% of the test animals when it is applied to the skin.

LC$_{50}$ is the concentration (expressed in parts per million) of a vapour in air or a liquid (water) which will kill 50% of the test animals exposed to the chemical over a set period of time.

Pesticides with low LD$_{50}$ or low LC$_{50}$ values (1 - 10) are extremely toxic.

Reduce the risk of pesticide poisoning

Accidental exposure or overexposure to pesticides can cause poisoning. Wearing protective clothing and equipment when handling or applying pesticides reduces the risk of pesticide poisoning. Risk of poisoning is reduced when the chance of exposure is reduced. Understanding the toxicity of a product and the potential for personal exposure allows risk to be lowered. No matter how toxic a pesticide is, if the amount of exposure is kept low, risk can be held at an acceptably low level. The toxicity of a
pesticide can't be changed, but you can reduce exposure to a pesticide and manage your risk.

**Read the Pesticide Label so that you know what precautions are required when using the pesticide**

**How to recognize poisoning**

Anyone who may become exposed to pesticides should be aware of the signs and symptoms of pesticide poisoning. **Prompt action** during accidental pesticide exposure can prevent serious consequences.

**Pesticide poisoning signs may include:**
- vomiting
- sweating or
- pin-point eye pupils

Poisoning symptoms are any **changes in an individual’s normal condition** and may include:
- nausea
- headache
- weakness or
- dizziness

**If you suspect pesticide poisoning, call 911. Be able to:**
- Identify the pesticide to which the victim was exposed and provide this information to medical authorities (i.e. Product Name and PCP#).
- Have a copy of the pesticide label available for medical authorities. The label provides important information that will assist them in treating a pesticide poisoning victim.
- Know the emergency measures you can take until medical help arrives. Read the label for first aid instructions.
- Contact the nearest poison control centre for information regarding the pesticide to assist with treatment

**Symptoms of pesticide poisoning are not always obvious**

What a victim might think is a cold or the flu could be a fatal pesticide poisoning. Whenever possible, find out the following critical information:
- Has the victim been exposed to a pesticide?
- If so, which one and how did the exposure occur?
- What emergency actions are on the pesticide label?

**When a pesticide poisoning occurs**

The key to surviving and recovering from a pesticide poisoning is rapid treatment. Take emergency action immediately when you suspect a pesticide poisoning. As
time continues to elapse after exposure, recovery is hindered and the toxic effects are heightened.

**Call 911**

Immediately call 911 if you suspect pesticide poisoning has occurred. If the 911 telephone number is not available in your community, consult your telephone directory for fire, ambulance and police emergency numbers.

**Protect yourself**

Protect yourself first with proper protective clothing (e.g., gloves) before entering a contaminated area, handling a patient, their contaminated clothing or dealing with a spill.

**When not to induce vomiting**

Do not induce vomiting when:
- the label says not to
- convulsions have occurred
- the victim is unconscious, or
- the pesticide contains petroleum products such as xylene

Pesticide application accidents can happen. Be prepared. Contact medical authorities if any symptoms of pesticide poisoning occur. It is better to be safe than sorry. See First Aid (Section 11) for additional information.

**Wash the victim’s skin thoroughly**

Always wash the victim's exposed skin with a detergent and plenty of water. Skin irritation can result from continuous exposure if not treated. If skin exposure occurs, obtain medical treatment. If the victim's clothing has been contaminated by a pesticide that is readily absorbed by the skin, remove the clothing and decontaminate the victim's skin.

**Cholinesterase test**

If you will be using organophosphate or carbamate insecticides, you should have a cholinesterase blood test done by a medical doctor before you use these pesticides in order to establish your base level. These types of pesticides inhibit the enzyme that stops nerve impulses between nerve cells. This test measures the level of the acetyl cholinesterase enzyme in your blood.

The enzyme is an important compound in nerve impulse transmissions. If you are at risk of exposure to these pesticides, you should be tested regularly. A drop in your normal level of enzymes could indicate you are being exposed to the pesticide.
Learning Objectives

After reading this section you should have a better understanding of pesticide poisoning risks with:

- Organophosphate and carbamate insecticides
- Synthetic Pyrethroid insecticides and plant derived pyrethrum
- Inorganic insecticides
- Microbial insecticides
- Bipyridyl herbicides
- Chlorophenoxy herbicides
- Anticoagulant rodenticides
- Acute rodenticides
- Fungicides

Characteristics of common pesticide poisonings

All pesticides in a given chemical group generally affect the human body in the same way; however, severity of the effects vary depending on the formulation, concentration, toxicity and route of exposure of the pesticide. It is important, therefore, to know both the type of pesticide you are using and the signs and symptoms associated with poisoning from it.

INSECTICIDES

Organophosphate and carbamate insecticides

The organophosphate family of insecticides and acaricides includes dimethoate, diazinon, chlorpyrifos, acephate and malathion. Many are highly toxic and are readily absorbed through the skin, lungs or digestive tract. Even the least toxic of this group is easily capable of poisoning humans when used improperly. Repeated exposure to small doses is also dangerous.

Carbamate insecticides, herbicides and fungicides

The carbamate family of insecticides, herbicides and fungicides vary from highly (insecticides) to moderately toxic (fungicides). Carbaryl and bendiocarb are examples of this family. Carbamates are broken down in the body rather rapidly and their effect on cholinesterase is quite brief and reversible. Carbamates are therefore referred to as rapidly reversing inhibitors of cholinesterase.
Acetylcholinesterase enzyme stops the message

Both chemical groups affect humans by inhibiting acetylcholinesterase, an enzyme essential to proper functioning of the nervous system. Acetylcholine is the substance that carries a nerve message from one nerve cell to another. Acetylcholinesterase is the enzyme that stops the message. If a sufficient amount of an organophosphate or carbamate insecticide is in the system the enzyme is prevented (inhibited) from doing its job. Chlorpyrifos, diazinon and malathion are organophosphate insecticides and propoxur and carbaryl are examples of a carbamate insecticide. The effects of these materials, particularly organophosphate insecticides, are rapid.

Symptoms of poisoning

Symptoms begin shortly after exposure, and in acute poisonings, during the exposure. Exposure to either of these insecticide groups may pose special risks for persons with reduced lung function, convulsive disorders, etc. Consumption of alcohol may enhance the pesticide effects.

The onset of symptoms in milder exposures can occur anytime up to 12 hours later, but usually within four hours.

Consequently, diagnosis of a suspected poisoning must also be rapid. It is important to be familiar with the signs and symptoms these types of pesticides cause. These symptoms may be mistaken for those of flu, heat stroke, heat exhaustion, or upset stomach.

Symptoms of organophosphate and carbamate poisoning

Mild exposures to organophosphate and carbamate insecticides include:

- headache, fatigue, dizziness
- anxiety, tremors of tongue and eyes
- loss of appetite with nausea or vomiting, stomach cramps and diarrhea
- blurred vision associated with excessive tearing
- contracted pupils of the eye
- excessive sweating and salivation
- difficulty breathing, tightness in chest
- slowed heartbeat, often fewer than 50 per minute
- muscles spasms or trembling, and
- cyanosis, loss of bladder and sphincter control

Symptoms of carbamate poisoning are of shorter duration
than those of organophosphate poisoning. Poisonings may also result in confusion, unconsciousness, seizures, coma and possibly death.

The order in which these symptoms appear may vary, depending on how contact is made with the pesticide. If the product is swallowed, stomach and abdominal cramps commonly appear first; if it is absorbed through the skin, stomach and respiratory symptoms tend to appear at the same time.

**Organophosphate or Carbamate poisoning**

Fortunately, good antidotes such as atropine sulfate are available at emergency treatment centres, hospitals, and many physicians’ offices. As with all pesticide poisonings, **time is extremely critical**.

*If a pesticide is swallowed, obtain prompt medical treatment. If a dermal exposure has occurred, remove contaminated clothing, wash exposed skin and seek medical care.*

Cholinesterase

**Cholinesterase** is an enzyme found in the blood. It allows the nervous system to control muscle movement. When a nerve impulse travels from the brain to initiate the movement of a muscle, it must pass through a number of nerve junctions (gaps). At each junction, a chemical called *acetylcholine* is released to carry the nerve impulse across the gap between nerve cells. When acetylcholine reaches the next nerve cell, the impulse continues to the next nerve cell.

![Diagram of nerve impulse and acetylcholine](Image)

When the nerve impulse has been received by the next nerve cell, the acetylcholine is then blocked and neutralized by a specific type of cholinesterase enzyme, (i.e. *acetylcholinesterase* (Ac).) This stops the nerve impulse from continuous transmission.

![Diagram of acetylcholine and cholinesterase](Image)
If acetylcholine is not blocked, repeated nerve impulses would be sent down the nerve causing muscle “tremors” or “fibrillations” to occur which can lead to fits or convulsions.

**Symptoms of poisoning**

High doses of organophosphate and carbamate insecticides can prevent (inhibit) or poison the cholinesterase enzyme by forming chemical combinations with them that prevent the enzyme from doing its work in the nervous system. When the enzyme is poisoned, nerve impulse transmission races out of control because of a build-up of acetylcholine at the ends of the nerve fibres.

This results in a variety of poisoning symptoms ranging from headache, fatigue, and dizziness in mild poisoning through to nausea, trembling, convulsions, respiratory failure in severe poisoning and may lead to death.

In general, mild exposure to organophosphate and carbamate pesticides at infrequent intervals is unlikely to produce toxic effects. There are usually no serious long-term effects from small exposures, providing renewed exposure is avoided until cholinesterase levels have returned to normal. However, there is a danger from repeated small exposures if the cholinesterase enzyme levels are not allowed to return to normal. If exposure continues, there may be a potential for long-term health effects.

Quick medical treatment is required in cases of organophosphate or carbamate poisoning. Many pesticides in these families are highly toxic and are readily absorbed through the skin, lungs or digestive tract. Even the least toxic of these families is easily capable of poisoning humans when used improperly.

**Acute symptoms usually occur within 12 hours of contact**

Symptoms of acute poisoning occur during exposure or usually within 12 hours of contact. The symptoms of carbamate poisoning are similar to those caused by the organophosphate pesticides, but the symptoms of carbamate poisoning are of shorter duration.
**Blood test**

A blood test for cholinesterase poisoning is available to help medical personnel establish whether the symptoms are the result of poisoning by organophosphate or carbamate insecticides.

**Find your base level**

There is no standard level of cholinesterase activity in human blood and each individual varies in this level of enzyme activity. Therefore, applicators working with organophosphate or carbamate insecticides should have their normal cholinesterase activity in their blood measured before working with these pesticides. This base level is used for comparison to subsequent tests when poisoning is suspected. As well, applicators who handle these pesticides on a regular basis should have regular blood test to check cholinesterase levels during the exposure period.

**Cholinesterase test**

Cholinesterase testing **must be done immediately following accidental exposure to be of value**. When poisoning occurs, the cholinesterase level in the blood as well as that at nerve junctions is reduced in activity. Therefore, if a reduced level of cholinesterase in the blood is detected, it indicates poisoning from these insecticides.

**NOTE:** Blood samples should be analyzed by a physician familiar with pesticide exposure and cholinesterase testing.

Applicators who handle organophosphate or carbamate pesticides on a regular basis should have:

- a baseline test to determine their cholinesterase enzyme levels before exposure as they vary between individuals
- a regular blood test to check cholinesterase levels during the exposure period
- a blood test after accidental exposure

**Organochlorine insecticides**

Most organochlorines have been removed from the marketplace because they are not readily biodegradable and they persist in the environment.

These materials affect the nervous system as stimulants or convulsants. Two organochlorine insecticides, lindane and methoxychlor, still have limited use.
Symptoms of poisoning

Nausea and vomiting commonly occur soon after ingesting organochlorines. Other early signs and symptoms include:

- excitability, dizziness, headache and disorientation
- weakness, a tingling or pricking sensation on the skin and
- muscle twitching

This is followed by loss of coordination, convulsions similar to epileptic seizures, and unconsciousness.

When chemicals are absorbed through the skin, twitching, tremors, confusion, and convulsions may be the first symptoms.

No specific antidotes are available for organochlorine insecticide poisoning. Remove contaminated clothing immediately, and then bathe and shampoo the person vigorously with soap and water to remove pesticide from the skin and hair. Persons assisting a victim should wear chemical resistant gloves and be careful to avoid becoming contaminated by the pesticide.

Botanical and synthetic botanical insecticides

Botanical insecticides are derived from naturally occurring plant materials. A common example of botanical insecticide is pyrethrin which is extracted from the flower of certain species of Chrysanthemum plants.

The term pyrethrin refers to several chemicals that are extracted from the plant. The most effective pyrethrins are pyrethrin I and pyrethrin II though several others pyrethrin compounds may be found in the formulation.

Synthetic botanical insecticides are insecticides that are synthetically created to resemble the structure and mode of action of a naturally occurring insecticide.

Mode of action for pyrethrins and pyrethroids

These insecticides are usually modified to improve on the natural product for example by improving effectiveness, reducing human toxicity or by increasing residual life. Examples of synthetic botanical pesticides are the pyrethroids, also called synthetic pyrethroids. Some examples of commonly used synthetic, pyrethroids, are d-trans allethrin, cypermethrin, permethrin and resmethrin.
Both the naturally occurring **pyrethrins** and the synthetically produced **pyrethroids** have a very similar mode of action and toxicological affects on humans and insects. Pyrethrins tend to have a higher acute toxicity and shorter residual effectiveness. These insecticides act by disrupting the electrical transmission of the nerve impulse down the axon. The axon is a long extension of the nerve cell body and is vital to the transmission of nerve impulses. Nerves exposed to these insecticides send a train of impulses down the axon until the ability of the nerve to function is depleted.

**Low percent of active ingredient and their relatively high LD₅₀ values reduce the risk of human toxicity.**

Poisoning by this group is rare due to the ability of the human body to metabolize (break down) the insecticide. Most pyrethroid metabolites are promptly excreted by the kidney.

**Symptoms of poisoning**

There have been very few systemic poisonings of humans by pyrethrin or pyrethroids. Dermal exposure will likely result in an allergic-type reaction such as skin irritation, stinging, burning, itching, and tingling progressing to numbness. The reaction from inhalation is usually irritation to the throat and lungs producing wheezing or coughing in some individuals. Ingestion of large quantities can cause severe poisoning symptoms but recovery in mammals is usually rapid.

- **Mild:** running nose, scratchy throat, dizziness, headache and salivation
- **Severe:** nausea, vomiting, diarrhea, lack of coordination, muscle tremours, increased rate of breathing or coma

**Role of synergists**

Chemicals that, while not possessing inherent pesticidal activity, nonetheless promote or enhance the effectiveness of other pesticides when combined. In cases of human exposure to commercial products, the possible role of other toxicants in the products should be considered. The synergists, such as piperonyl butoxide, have low toxic potential in humans but **toxicity of the insecticide is increased** because the synergist deactivates the enzymes that attack the insecticide. If organophosphates or carbamates are included in the product, it may have significantly higher toxicity.
Inorganic insecticides
Boric Acid, Borates and Borax dust are moderately irritating to skin. Inhaled dust causes irritation of the respiratory tract and shortness of breath. In severe poisonings of infants, an intense red skin rash, most often affecting palms, soles, buttocks, and genital area, has been show to occur that is followed by extensive skin peeling.

Microbial insecticides
*Bacillus thuringiensis* (Bt) is a bacteria. From studies involving deliberate ingestion by human subjects, it appears possible that the organism can cause inflammation of the digestive tract. No irritation or sensitization effects have been reported in workers preparing and applying commercial products.

Herbicides
Bipyridyl herbicides
The most common bipyridyls are diquat and paraquat. Paraquat is more toxic than diquat and produces chronic abnormal cell growth in the lungs, cornea and lens of the eye, nasal mucosa, skin, and fingernails and may damage the liver, kidney, linings of stomach and intestine. Diquat affects the eye lens and intestinal tract lining, but does not usually produce the frequently fatal lung changes characteristic of paraquat. This family of pesticides is very toxic through all routes of exposure. Repeated vomiting generally follows.

Symptoms of poisoning
Large doses of diquat also produce restlessness and reduced sensitivity to stimulation. Ingesting diquat or paraquat causes severe irritation to the mucous membranes of the mouth, esophagus, and stomach.

- **Mild**: nosebleeds, skin blistering, cracking of nails and cornea injury
- **Moderate**: nausea, vomiting, diarrhea, cough, burning pain in mouth, throat, stomach and intestines
- **Severe**: profound dehydration, delayed harm to lungs, coma and death

There are no specific antidotes to counteract effects of bipyridyl herbicides once significant exposure and absorption has occurred. If ingested and victim is fully conscious induce vomiting immediately. Flush affected eyes with water, or wash skin with soap and water. Seek medical attention immediately.
### Chlorophenoxy herbicides

Compounds such as 2,4-D and MCPA are examples of chlorophenoxy herbicides. These compounds mimic the plant growth hormones of broad-leafed plants causing accelerated growth and death to the plant.

### Symptoms of poisoning

They are moderately irritating to human skin and mucous membranes. Inhalation may cause a burning sensation in the nose, sinuses and chest, and coughing may result. Prolonged inhalation sometimes causes dizziness.

These compounds are absorbed across the stomach and intestine wall, lung and skin. Exposure by breathing and absorption of these pesticides on the skin can produce ill effects. Chlorophenoxy herbicides can be moderately irritating to the skin, eyes, respiratory tract and gut lining.

Irritation of the stomach usually leads to vomiting soon after ingestion, chest and abdomen pain and diarrhea. Headache, mental confusion, and bizarre behavior are early signs and symptoms of severe poisoning which may progress to unconsciousness.

- **Mild:** chest pain, abdominal pain and diarrhea.
- **Moderate:** headache, double vision, vomiting, muscle weakness and loss of appetite.
- **Severe:** fever, cardiac arrhythmias and convulsions.

If ingested induce vomiting in an alert victim. There is no antidote for chlorophenoxy herbicides. Seek medical attention.

### Rodenticides

#### Anticoagulant rodenticides

Anticoagulant rodenticides prevent the formation of blood clots and are easily absorbed into the intestinal tract. These include *coumarins such as brodifacoum, bromadiolone and warfarin.*

### Symptoms of poisoning

The main signs and symptoms are nosebleed, bleeding gums, blood in the urine, tar-coloured feces, and large irregular blue-black to greenish-brown spots or patches on the skin. *Brodifacoum* may cause serious poisoning of non-target mammals, especially dogs, at much lower dosages. *Indandiones* are also anticoagulant rodenticides. *Examples are chlorophacinone and diphacinone.*

### Prevents blood clotting

Anticoagulant rodenticides prevent blood clotting and have a very high acute mammalian toxicity and should be used very carefully.
Accidental poisoning occurs by ingestion. These rodenticides are easily absorbed into the intestinal tract.

After repeated ingestion for several days, symptoms of poisoning include difficulty breathing, weakness, lack of appetite, pale or abnormal white skin colour, nosebleed, blood in the stool, vomit, or urine, bleeding gums, bruising of skin, ears, or eyes and death. Brodifacoum may cause serious poisoning of non-target mammals, especially dogs, at much lower dosages. Vitamin K₁ is an antidote for anticoagulant rodenticides but must be administered by a physician. A physician may also administer a full blood transfusion and gastric lavage (stomach pumping).

Inorganic rodenticides

Zinc phosphide is an inorganic acute rodenticide that causes severe irritation if ingested. It reacts with water and stomach juices to release phospine gas which can enter the blood stream and affect the lungs, liver, kidneys, heart and central nervous system. Zinc phosphide is easily absorbed through the skin or inhaled from fumes. With repeated exposure, it accumulates in the body to dangerous levels.

Symptoms of poisoning

Signs and symptoms of mild zinc phosphide poisoning include diarrhea and stomach pains. In more severe cases, nausea, vomiting, chest tightness, excitement, coldness, unconsciousness, coma and death can occur from pulmonary edema and liver damage.

There is no antidote for zinc phosphide poisoning. It is a slow-acting material, which gives the victim time to get medical help. The pesticide is an emetic which causes a person (not a rat or horse as they cannot vomit) to vomit if swallowed.

FUNGICIDES

Fungicides vary enormously in their potential for causing adverse effects in humans. Most fungicides currently in use are unlikely to cause frequent or severe poisonings other than as skin and mucous membrane irritants and dermal sensitizers.

Dithiocarbamates and Thiocarbamate

These families include fungicides such as thiram, mane and zineb. Thiram has a moderate to high toxicity while the other compounds are considered to be of low toxicity.

Most are skin irritants.
Symptoms of poisoning: Irritation to the skin, eyes, nose, throat or lungs. Very large doses of exposure may cause nausea, vomiting or muscle weakness, diarrhea, convulsions and unconsciousness.

Other agents - petroleum products: Petroleum products are used as solvents, carriers, diluents and pesticides (e.g. dormant oils). Two types of petroleum products may affect human health:
- petroleum distillates; and
- aromatic hydrocarbons.

Petroleum distillates include kerosene, mineral oil and diesel oil. They are used as part of the pesticide formulation as a diluent or they act as a pesticide (e.g. dormant oil). Petroleum distillates have a wide range of toxicities.

Symptoms of poisoning:
- Acute poisoning: Nausea, vomiting, coughing and irritation to the lungs. This may progress to bronchial pneumonia with fever, weakness, dizziness, slow and shallow respiration, unconsciousness and convulsions.
- Chronic poisoning: Weakness, weight loss, anemia, nervousness and pains in the limbs or numbness in the fingers and toes.

Aromatic hydrocarbons: Aromatic hydrocarbons (e.g. xylene) are non-active ingredients that are used in many pesticide formulations. They have a wide range of toxicities.

Symptoms of poisoning: Dizziness, agitation, headache, nausea, vomiting, tightness in chest and staggering, blurred vision, rapid respirations, paralysis, unconsciousness and convulsions.

Pesticides with low LD$_{50}$ or LC$_{50}$ values (0-10) are extremely toxic.

<table>
<thead>
<tr>
<th>Pesticide</th>
<th>Acute Oral LD$_{50}$ (mg/kg)</th>
<th>Toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brodifacoum</td>
<td>0.27</td>
<td>High</td>
</tr>
<tr>
<td>MCPA</td>
<td>700 - 1,000</td>
<td>Medium</td>
</tr>
<tr>
<td>Malathion</td>
<td>1,375</td>
<td>Medium</td>
</tr>
<tr>
<td>Boracic acid</td>
<td>&gt;3,000</td>
<td>Low</td>
</tr>
</tbody>
</table>
The above $LD_{50}$ values are the textbook values based on the technical grade material (as close as pure as possible). The warning signs and symbols on a pesticide product label are based on the product concentration.

For example, chlorpyrifos at a 100% concentration has an oral $LD_{50}$ of 135-163 mg/kg and requires a skull and cross bones inside an octagon and the signal words DANGER and POISON on the product label. This contrasts with a 1% concentration having an oral $LD_{50}$ of >2000 mg/kg which requires a skull and crossbones inside a diamond and the signal words CAUTION and POISON on the product label.

Information on Oral $LD_{50}$ levels is usually available from the vendor or registrant in the form of a Material Safety Data Sheet (MSDS). Information on the Oral $LD_{50}$ is not enough to tell you how toxic the pesticide is. You must also know the toxicity for dermal and inhalation absorption. **You can find out how toxic a pesticide is by reading the label on the product.**

Symbols and signal words show the acute toxicity of the product (see the Pesticide Label Section 4).

Assessing Chronic Toxicity

It is not possible to assess chronic toxicity of a pesticide in the same way as acute toxicity. Instead, a number of different toxicity tests are performed on animals. These tests help to predict whether a pesticide will cause long-term effects.

Test animals are exposed to low levels of pesticides for periods ranging from about 90 days to several years. The tests may use oral, dermal or respiratory exposure. The animals are examined to determine whether the exposure has caused any toxic effects.

Remember that the symbols on the label do not give information about the chronic toxicity of the pesticide.

The label may include a written warning about the product's ability to cause chronic effects.

**Remember, pesticides are not only toxic to humans. They can be even more dangerous for fish and birds and other wildlife. Follow all label precautions to protect yourself, others and the environment.**
Learning Objectives

After reading and studying this section you should know:

- which protective gear should always be worn when handling pesticides
- how to interpret statements on the label to choose the proper equipment to protect yourself
- how to protect yourself in the various stages of the application process
- personal protective equipment for pesticide applications
- how to maintain and clean protective clothing and equipment

Reduce hazards and risk

You can reduce the hazards of using pesticides by wearing protective clothing and equipment. The protective clothing and equipment you need to wear depends on the pesticide label and the spray operation.

What to wear

When handling any pesticide, the user should always wear:

- long-sleeved shirt and pants, or coveralls
- gloves, unlined, elbow length
- boots, unlined, tall in height

Some situations such as mixing and loading, or the use of a highly toxic product, require extra protection such as:

- a water repellent suit (rain suit)
- a waterproof apron
- goggles
- a face shield
- a respirator

How to Decide What is Needed

Read the label

The section on the label called Precautions will help you decide what protective clothing and equipment is needed. Consult with your supervising licensed exterminator for more information regarding proper personal protective equipment.
<table>
<thead>
<tr>
<th>If the label states:</th>
<th>You should wear appropriate:</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Avoid contact with skin&quot;</td>
<td>Gloves, coveralls, boots, and water repellent hat</td>
</tr>
<tr>
<td>&quot;May cause eye irritation&quot;</td>
<td>Goggles, Face Shield</td>
</tr>
<tr>
<td>&quot;Avoid breathing spray mist&quot;</td>
<td>Respirator</td>
</tr>
</tbody>
</table>

**Information on the label**

The statements in the precautions section will be different for each pesticide. Always read the label carefully before deciding what protective clothing and equipment to wear. Never assume that the precaution statements will be the same for each pesticide.

**Consider the job**

The protective clothing and equipment you need depends on the job you are doing. Each pesticide application is different. Consider what is needed for each stage of the job. Consider the equipment being used and the weather conditions of the day.

**Four stages**

The pesticide application process can be divided into four stages:

- Read the label
- Mixing and loading
- Application
- After application

**Read the label**

Before measuring, mixing or loading a pesticide, read the label to find out what protective clothing and equipment you need. Make sure that all equipment is in good running condition so that it does the job. Have plenty of soap and water available in case of an accident.

**Mixing and loading**

The potential for pesticide exposure occurs most often during mixing and loading. Protective clothing and equipment are very important during this process because the pesticide is in a concentrated form and is more dangerous. A spill or splash can do more damage. Always make sure your skin is covered. Wear the appropriate long sleeved shirt and pants (or coveralls), gloves, and boots.

An apron will provide extra protection to the front of the body. Consider using goggles and a respirator even if the label does not suggest them.

Use scissors to open dust or wettable powder formulation
packaging. Do not tear or open with your teeth! Do not open packages in windy areas. Use the proper filter in your respirator.

**Bystanders should be warned of the danger and kept away from the area.**

### Application

Protection during application will vary with the operation. If you will not come in contact with the spray solution, you may not need as much protection.

For example, you may need only a hat, gloves, coveralls and boots to provide enough protection if you are spraying with a low pressure sprayer. However, a person spraying with a high pressure sprayer will need more equipment, gloves, boots, a rain suit with a hood, safety goggles, and a respirator to give adequate protection from the spray.

Extra protection may also be needed if the machinery needs repair. Keep gloves, boots, apron and goggles available with you. If it is necessary to make repairs, use the extra protective clothing and equipment. A small brush conveniently located with you can help unclog spray nozzles.

### After application

Even though the pesticide application has been completed, the process is not complete until after the clean up.

Exposure can occur during clean up just as easily as during any other time in the pesticide application process. For example, the rinse solutions can easily splash while the spray tank is being rinsed. Remember to wear a long sleeved shirt, pants, gloves, boots, and a chemical resistant apron during clean up. Please see the section on handling contaminated clothing for more information.

### Protective Clothing and Equipment

#### Gloves

Even though the pesticide application has been completed, the process is not complete until after the clean up.

Exposure can occur during clean up just as easily as during any other time in the pesticide application process.

For example, the rinse solutions can easily splash while the spray tank is being rinsed. Remember to wear a long sleeved shirt, pants, gloves, boots, and an apron during clean up. Please see this section on handling contaminated clothing on page 8 for more information.
The hands almost always become contaminated when handling pesticides. To protect them, wear unlined, elbow length gloves that are resistant to chemicals. Suitable gloves may be made from neoprene, nitrile or PVC (polyvinyl chloride). The most suitable glove material depends on the type of pesticide handled.

Never wear lined gloves, or gloves made from leather or cloth. These materials absorb the pesticide and keep it in contact with the skin. Replace gloves on a regular basis. No one knows for certain how long gloves will last when they are in contact with pesticides.

Pesticides will weaken any glove material over time. Always check gloves for leaks before using them. Fill them with water and gently force the water down to the finger tips. Gloves that leak do not give any protection. In fact, they help to increase absorption by keeping the pesticide in contact with your skin.

Throw out gloves that have even small leaks. For the best protection while wearing gloves fold down the top of the glove to make a cuff. The cuff will stop the pesticide from running down the glove and onto your arm.

Body covering

To protect the body, wear a long-sleeved shirt and pants. Coveralls, worn over regular work clothes, give good protection. Keep one pair of coveralls to wear only when you are spraying pesticides. Remember to wash the coveralls separate from other laundry after each use. (See Care of Protective Clothing and Equipment)

You can also wear disposable coveralls designed for pesticide use. But make sure that the disposable coveralls you purchase are the right ones. Disposable coveralls designed to protect against dust and dirt will not protect you against pesticides.

Disposable coveralls specifically designed for pesticide use include:

- TYVEK QC® coverall made by Dupont Canada Inc.
- Saranex® 23P coverall made by Dupont Canada Inc.
- Kleen Guard EP (Extra Protection – stitched red seam) coveralls made by Kimberly Clark
Be sure to dispose of the coveralls safely. Put them in a plastic bag and dispose of them in the garbage destined for a sanitary landfill site.

Some situations require additional protection. If you are working in a mist, you should wear water repellent clothing such as a rain suit with a hood and goggles in addition to boots and gloves.

**Apron for mixing and loading**

Extra protection is also necessary when mixing and loading the pesticide. Wear a chemical resistant apron to protect the front of the body from splashes and spills.

**Boots**

Your feet can easily be contaminated if you walk through spills, enter treated areas, test spray nozzles or spray close to your body. Wear unlined boots for protection.

Do not tuck your pants into the boots. Pant legs worn outside stop pesticides from getting into the boot. If the pesticide does get inside, wash and change your boots and socks immediately.

**Do not wear canvas or leather shoes and boots.** These materials absorb the pesticide. Lined boots should not be worn for the same reason. The cloth lining absorbs the pesticide and cannot be washed out.

**Headgear**

Wear a waterproof hat to protect your head. A wide brimmed rain hat provides the best protection, especially if the spray may contact your skin. Some rain suits have hoods attached and these provide good protection for the head and neck areas. Avoid wearing baseball caps or hats with cloth or leather sweat bands. These materials absorb the pesticide and provide little protection.

**Goggles**

Your eyes are the most sensitive part of your body - give them special protection. Some pesticides cause eye irritation and may cause severe damage if they contact the eyes. **Eyes absorb pesticide quickly and completely.** Protect your eyes by wearing goggles when there is any chance of getting pesticide in the eyes. Prescription eye glasses do not provide complete protection.

Safety goggles will fit easily and comfortably over the top of normal eye glasses. Do not wear contact lenses when handling pesticides. Contact lenses absorb the pesticide and keep it in contact with the eyes.
### Face shields

You can protect your whole face with a full face shield. Face shields provide protection from any spills or splashes that happen during mixing and loading, when the pesticide is still concentrated. Face shields are comfortable to wear and fit easily over goggles. Some types attach to hard hats. Others incorporate a respirator.

### Respirators

A respirator is a unit that covers the mouth and nose to prevent spray droplets, small particles, and vapours from getting into the lungs. **A dust mask is not a substitute for a pesticide respirator.** Never store or keep a respirator with pesticides. Keep the respirator and cartridges separated and in sealed plastic bags inside the vehicle cab or other protective site. Prior to using a respirator the user must have a seal test completed. Facial hair will generally prevent a proper seal.

Respirators protect the user from breathing in pesticide contaminated air. Various pesticide formulations require different types of respirators. The product label will indicate whether or not you need a respirator or not and if so what type. The Technician should consult with their supervising licensed exterminator the issue of a respirator.

**A respirator is a safety device that covers at least the mouth and nose area.**

Generally speaking there are two major groups of respirators that are used when dealing with pesticides;
- air supplying respirators
- air purifying respirators.

**Air supplying respirators**

Air supplying respirators provide clean uncontaminated air from an outside source. Air supplying respirators are used in low oxygen environments and are generally big and bulky and more difficult to work in.

**Air purifying respirators**

Air purifying respirators use physical and chemical filters to trap and remove contaminants as they pass through the respirator with air being breathed by the wearer. Adequate oxygen must be present in the air that is being breathed in because an air purifying respirator does not supply oxygen. Air purifying respirators only filter the existing air that is being breathed in.
Air purifying respirators may be **powered or non-powered**. The powered air purifying respirators use a blower to move the contaminated air through a purifying filter and can be used with either a tight fitting face piece or a loose fitting hood. The non powered devices can be either half masks or full face devices that place a filtration unit between your breathing passage and the contaminated air source. Filters and cartridges are chemical specific or dust mist specific or can be a combination chemical and dust mist.

There are two kinds of air purifying respirators,

- a chemical cartridge respirator, available in a half mask or full face version,
- the canister gas mask. Make sure that the cartridge or canister you use has a safety- approved sticker that says "NIOSH" (for National Institute for Occupational Safety and Health) or "MSHA" (for Mine Safety and Health Administration).

### Half-mask cartridge respirator

The half-mask chemical cartridge respirator is the most common air purifying respirator. It consists of pre-filter pads to remove dusts and small particles, and cartridges containing activated charcoal to remove vapours and spray droplets. Special cartridges are needed for protection against pesticides. Make sure you ask for cartridges that protect against organic vapours when you buy a respirator or replacement cartridges.

**The pre-filter pads (outer filters) should be changed as required.**

Keep track of how long your cartridges are in use, and replace them regularly. If you can smell or taste “pesticides” while using the respirator, you are experiencing “break through”. Assuming you are wearing the unit properly break through indicates that your cartridges need to be replaced. Avoid break through - Change the cartridges regularly.

### Store cartridges in sealed plastic bag

Caution: Cartridges should be stored separately from pesticides and in a sealed plastic bag to prevent “break through”.

Breakthrough is when the filter reaches a point of chemical saturation and no longer provides protection.

The pesticide label provides guidance on which type of filter or cartridge to use. The technician is to consult with their supervising licensed exterminator regarding the issue of a respirator.
Respirator fit test

For a respirator to work properly it needs to form a proper seal around the nose and mouth. Any time the Technician is required to put on a respirator they need to check that there is a complete seal around their face and air cannot leak in or out around the edges. Checking the seal is called a “fit check”. To check, put the respirator on and make sure there is a firm and comfortable fit all around the mask.

There are generally 2 types of “fit tests”. These are the positive fit tests and the negative pressure fit test. These are usually done in the field.

Positive pressure fit test

A positive pressure fit check is when you cover the exhalation valve with your hand and exhale gently into the face piece. If a slight positive pressure is built up inside the face piece without any evidence of leakage, the fit is satisfactory.

Negative pressure fit test

A negative pressure fit check is when you close off the air inlet valve (cover the cartridges with your hands) inhale gently to collapse the face piece slightly and hold your breath for 10 seconds. If the face piece remains slightly collapsed and no leakage is detected, the respirator fits properly.

Facial hair

Most respirator styles will not protect the user if you have a beard or other facial hair where the mask needs to make a seal against the face. If facial hair or the inability to get a proper seal with a face mask style respirator a loose fitting hood or helmet style can be used.

Care of Protective Clothing and Equipment

Handling contaminated clothing

After the spray operation has been completed, clean all protective clothing and equipment.

You can avoid contamination when removing clothing and equipment, by keeping your gloves on.

Always remove protective clothing and equipment outdoors. If a granular pesticide was used, shake the clothing outdoors, emptying pockets and cuffs. Do not store or transport your safety equipment with open pesticide containers.

Be aware that footwear can contaminate non target areas. Clothing that has been contaminated by spills of highly toxic or concentrated pesticide should be thrown out. Place
clothing in a plastic bag and dispose of it. Coveralls and other spray clothing must be washed separately from other clothes. They should be washed after each use. Place them in a plastic bag and keep them separate.

With hands still protected by gloves, wash protective equipment. It is best to wash equipment outdoors. If you do not have an outside clean-up area, keep certain buckets just for equipment clean-up. Mark them and keep them in a special place. Wash goggles, hat, boots, and any water repellent clothing in warm soapy water, rinse well and let them air-dry.

Next wash the outside of the gloves with soapy water and remove them. Place dry, clean articles in a proper storage area until next use.

Often the person responsible for laundering the spray clothes is not the person doing the spraying. Make sure that the person washing the clothes is aware of proper laundry procedure and ways to protect themselves from exposure. Always be careful not to let pesticide residues contaminate the inside of your vehicle. With a truck, keep the cab neat and tidy and avoid carrying pesticides in the passenger compartment. Remove your pesticide contaminated clothing before you enter your vehicle.

**How to wash clothing**

All clothing used for spraying must be washed separately from other clothing. They should be washed after each use. Remember to use gloves to handle clothing.

Pre-soak clothing before washing; use one of three methods:

- hose off garments outdoors
- soak in separate tub or pail
- use pre-wash cycle in automatic washer

Place clothing directly into the washing machine. Wash only a few garments at a time. **Do not wash with other family clothes.**

Use hot water, the highest water level, and the longest cycle, with heavy duty detergent. Wash as you would for heavily soiled clothing. Wash clothing again. After washing, preferably hang outside until dry.

Clean the washing machine. Run the washing machine through one complete cycle using only detergent and hot water. (No clothing).
**Personal hygiene**

When you are finished for the day, or become contaminated, take a bath or shower as soon as possible and change into clean clothes. The longer a pesticide remains on your skin, the greater the risk that it will be absorbed into your body. Wash your hair and under your fingernails. Shower with lots of soap and water.

Always remember to wash your hands before you go to the toilet, eating, drinking, or smoking.

**Use clean work clothes each day.** A small spill on yesterday's clothes may seem unimportant, but wearing the same clothing for several days without washing them prolongs the exposure and increases your risk.

**Handling respirators**

Remove the cartridges and filters from the respirator. Place them in clean, sealed plastic bags. Wash the respirator in warm soapy water. Rinse well and let it air-dry. Air-drying prevents damage to the inlet and outlet valves.
Learning Objectives

After reading and studying this section you should know:

• how pesticides effect the environment
• how to protect the environment from contamination
• integrated pest management practices

We have become more aware over the past decades of the importance of protecting the natural environment and the need to prevent the careless use of pesticides.

It is your responsibility to protect the environment in the performance of your work and it is your supervising licensed exterminator's responsibility to select a pesticide that will have minimum impact on health and the environment. Make sure that you use pesticides safely and only when needed. Always read the pesticide label.

Remember that a healthy environment is everyone's responsibility. Keep the pesticides on target and avoid environmental contamination.

Pesticide movement

There are two major routes by which pesticides drift off the targeted area. They are spray drift and vapour drift. Pesticides can also move off the targeted area by surface runoff and leaching.

Spray drift

Spray drift is the movement of spray droplets carried off the target area by wind. Spray drift can be reduced by using larger nozzle sizes, reducing the pressure (e.g., reducing the RPM of the engine or lowering the pressure regulator) or confining the spray pattern.

To reduce spray drift, avoid spraying when winds are higher than 10 km/hr. Always be mindful of wind speeds. It is your responsibility to stop applying the pesticide when conditions are too windy.

Vapour drift

Vapour drift is the movement of pesticide vapours off of the targeted area by air movement.
Volatilization

Volatilization is the process of a liquid or solid changing into a vapour when it is exposed to air. Pesticides that change more quickly into vapour than others are referred to as having a high volatility. The volatilization of pesticides increases with high temperature and when smaller size spray droplets are applied.

Volatilization is deemed beneficial to control certain pests under very restrictive and controlled conditions. In the structural industry for example, a pesticide with high volatility such as "Dichlorvos" is used as a spot treatment in wall voids (e.g., to control wasps).

In contrast, in some land exterminations (e.g., agriculture and forestry) a low volatile ester 2,4-D (available in amine and ester formulations) may be deemed beneficial to obtain better weed control, however the use of an ester formulation can present risks. This is primarily due to the close proximity of susceptible plants easily damaged by volatilization of the ester.

To reduce volatilization of a pesticide, avoid spraying when temperatures are high. In addition, your supervising licensed exterminator should choose a pesticide formulation with no or low volatility.

Surface runoff

Surface runoff occurs when water moves the pesticide from the treated area into streams, rivers, ponds, and wells. Large quantities of pesticide residue found on the surface of soils and plants can be washed into our bodies of water when a heavy rain occurs shortly after the application.

The greatest runoff damage and losses are usually caused by runoffs due to rain that occurs within 24 hours of a pesticide application.

Pesticide runoff can pollute our wells, ponds, streams, rivers and lakes, and may contaminate our groundwater, causing serious damage to plants, animals and the environment, and may impact drinking water sources or irrigation waters.

Reducing pesticide run off

Pesticide runoff can be reduced by:

- using adjuvants to make the pesticide adhere to plant surfaces
• incorporating the pesticide into the soil as soon as possible
• observing weather conditions and delaying pesticide applications when rain is expected within 24 hours

Off-target movement of pesticides indoors
When applying pesticides indoors, ensure fans, open windows etc. do not allow breezes to move your pesticide off target. Use a crack and crevice nozzle attachment to avoid surface runoff and contamination of non target areas. If using products that are volatile make sure all points of ignition are turned off.

Leaching
Leaching occurs when a pesticide dissolved in water moves down through the soil. Combined with soil moisture it may leach into the groundwater or flow through a drainage system (e.g. storm sewers, municipal drains) into surface waters.

One of the causes of groundwater contamination is leaching of pesticides. When this occurs it is difficult and costly to correct the situation. Prevent groundwater contamination by following proper pesticide application and safety precautions.

Water contamination
A body of water can be easily contaminated if an inappropriate pesticide is applied or an improper application made. Some pesticides are highly toxic and lethal to fish and the organisms that they eat. Low pesticide concentrations may adversely affect the ability of fish to reproduce. Pesticides can also bio-accumulate in fish making them unsuitable for eating.

Preventing water contamination
You can prevent contamination of water sources by following these steps:
• never spray to the edge of a body of water (always leave an area of unsprayed natural vegetation- this is called a buffer zone)
• never use water from a well, lake, river, or other surface source without an anti-backflow device on your spray equipment (a requirement of Reg. 63/09)
• never wash any spraying equipment close to a well, lake, river, or other surface water (a requirement of O. Reg. 63/09).
• apply pesticides according to label directions and recommendations, and, if possible, use the lowest recommended pesticide application rate
• carefully measure the amount of pesticide loaded into the sprayer
• make certain the sprayer is correctly calibrated with excellent upkeep
• spray outdoors only when weather conditions are suitable

Always read the label for information on buffer zones.

Preventing soil contamination

Many pesticides degrade or break down in the soil, while others persist for long periods of time. Persistent pesticides in the soil pose the greatest risk of water contamination through leaching and/or surface runoff. They can additionally cause damage to sensitive or susceptible crops planted the following season in these soils.

**Prevent soil contamination by:**

- using the amount of pesticide recommended by the label
- avoiding spills during mixing and loading
- preventing tanks from overflowing when filling
- disposing of containers or surplus spray mixtures properly

Spills on sand or sandy loam soils can lead to serious contamination of groundwater through **leaching**. Spills on clay soils are more likely to spread to other areas because of **surface runoff**.

Protecting bees

Bees are important beneficial insects that pollinate our tree fruits, small fruits, legumes, and other vegetables. Bees can easily be poisoned through direct exposure during spray operations. Bees can also be indirectly poisoned if the pollen collected and stored in their hive is contaminated with pesticide residue.

The extent of damage to any bee population will be influenced by the kind of exposure, the toxicity of the pesticide, and its persistence. Extra precautions must be taken in any locality where bee hives are kept.

**Do not apply insecticides while tree fruits and other crops are in bloom. The "Bees Act" makes it an offence to do so in Ontario with substantial fines.**

Environmental protection guidelines for the application of pesticide

Under the direction of your supervising licensed exterminator the following procedures can help you to protect the environment, if you must use a pesticide:

- read the label and follow all instructions carefully
• never exceed the maximum application rates recommended on the label and observe all its application precautions
• follow the instructions of your supervising licensed exterminator
• make certain the sprayer or spreader has been properly calibrated by your supervising licensed exterminator to ensure that the correct spray volume or granular amount is delivered
• handle and mix a pesticide at all times with due care and use appropriate safety equipment
• use appropriate buffer zones around sensitive areas
• never apply a pesticide before visually checking the area for health and safety hazards (e.g. children’s toys, laundry on clothes lines, open food and barbecues should be removed, sand boxes and ornamental ponds, swimming pools) susceptible plant life should be covered to prevent contamination
• never apply pesticides outdoors when weather conditions are unsuitable
• never carry or mix pesticides near any body of water or a drain.

**IPM best practices**

Integrated Pest Management (IPM) practices includes the;
• incorporation of IPM practices into a client’s program.
• use of pesticides only when necessary. The use of pesticides may be reduced by employing non-pesticide alternatives
• land:
  • de-thatching
  • aeration
  • pruning
  • improved cultural practices
• structural, the use of sanitation practices including:
  • reporting
  • pheromone traps
  • monitor boards
• aquatic: mechanical harvesting.

Follow your supervising exterminator instructions with regard to IPM practices.

A technician can advise a customer on cultural matters as instructed by his or her supervising exterminator and or employer.
## Learning Objectives

After reading and studying this section you should know:

- safe practices for transporting pesticides
- safe practices for storing pesticides
- safe practices for disposing of pesticides and pesticide containers

## Safe practices

It is important for the technician to know the “safety first practices” on how to handle pesticides safely, when transporting, storing and disposing of spills, left over pesticides and spent containers.

There is a greater risk of mishap whenever pesticides are handled. Since careless handling, incorrectly maintaining of equipment and unforeseen accidents can all lead to pesticide spills, **safe practices need to be implemented to reduce the potential of a spill.**

These safe practices, once in place and practiced by the technician, **will significantly reduce** the pesticide exposure risk to themselves, others and the environment.

Accidents can happen at any point along the distribution chain the first line of defense is to prevent accidents from happening in the first place.

## Avoid risk of spills and contamination

This section contains information on what can be done to help avoid the risk of spills.

## Cargo area

The cargo area is where pesticide containers are placed for transit. The floor of the cargo area should be constructed of a non porous material. Avoid transporting pesticides on a wooden truck bed or a carpeted trunk. Wood and carpets absorb pesticides and may contaminate future loads as well as the handler. Pesticide containers can be transported in a metal or plastic storage box or on a plastic tarpaulin.

The cargo area needs to provide protection from tears and punctures or impacts from the shifting of other objects, shifting that could lead to container damage.
Additionally, any pesticide load should be covered by a water repellant cover to protect the pesticides from the elements and prevent the pesticides from leaking any residue into the environment if it rains. A fiberglass or aluminum securable truck cap is preferred since if the load is unattended at any time it can be locked.

No one shall transport a pesticide by a vehicle unless the pesticide is secured in a manner sufficient to prevent the escape or discharge of the pesticide from the vehicle.

- inspect containers for damage before loading
- load containers carefully and secure the load
- have the load stabilized so that it can't shift and nothing will shift into the pesticide containers

The safe and proper storage and transports of pesticides in your vehicle will protect you and the environment. Make certain that the pesticide containers are secure.

**Container inspection**

Carefully inspect each container of pesticide before you accept it for transportation. Make sure there are no broken bags or cartons and no leaking liquid containers. Do not accept any damaged containers.

If damage occurs during transit the contents of a damaged container must be placed in another container of the same composition (i.e., glass to glass, metal to metal etc.) See “Spills” section 12 to see how to handle “Spills”.

**Avoid transporting passengers and pesticides in the same compartment of the vehicle** (cab or back of truck) Spills and hazardous fumes can negatively impact any occupant. Carry pesticides in the back of a truck and people in the passenger compartment.

**No one may transport any Class 1, 2, 3 or 4 pesticide together with:**

- food or drink intended for human or animal consumption
- household furnishings
- toiletries, clothes, bedding or similar commodities

**Unattended vehicles**

Always lock your vehicle before leaving it unattended. An unattended vehicle storing pesticides must be placard with a visibly affixed pesticide storage sign G illustrated at the MOE website (s. 108 O. Reg. 63/09). Ensure that your vehicle is secured (locked) to restrict unauthorized access.
to the pesticide application equipment, sprayers, as well.

It is important to **protect pesticides from the extremes of weather**
- water or excess moisture can cause damage to pesticide containers and their contents
  - metal containers to rust
  - paper and cardboard containers to split or crumble
  - pesticide labels to peel, smear, or become unreadable
  - dry pesticides to clump, degrade, dissolve
  - slow release products to release their active ingredients
  - extremes of temperature from hot to cold can rupture containers

**Vehicle identification sticker**

A licensed operator (i.e., a person who manages a pest control company) must ensure that all vehicles transporting or applying a pesticide have a vehicle identification sticker, issued by the MOE. These vehicle identification stickers may be obtained from the MOE Environmental Assessment and Approvals Branch at **1-800-461-6290**.

As a technician it is your responsibility to make sure that this vehicle identification sticker sign is on any vehicle you are required to operate for the purpose of transportation and/or the application of a pesticide.

**Important technical information and safety equipment that the Technician needs to have in the transporting vehicle are as follows:**
- **Technical data** for available pesticides products and emergency information for a possible spill response. This would include product **labels and material safety data sheets (MSDS)** containing information on handling, storage, (hot and cold), and potential environmental hazard. This information needs to be available for emergency personnel
- **Emergency numbers:**
  - fire department
  - hospital and poison control centre
- **Personal protective equipment** appropriate for the pesticides in transit
- **Carry an emergency spill kit including:**
  - a shovel and broom
  - garbage bags,
• fire extinguisher rated for chemical fires,
• absorbent material such as kitty litter in case of a spill

- **Know the location of emergency spill containers** in case a container breaks.

It is important that the technician be prepared for a spills mishap regardless of how it is caused.

**Safety checklist**

**Safe transport of pesticides check list:**

- inspection of containers before loading
- do not transport pesticides in a manner that will contaminate food, feed or other personal items
- proper loading of containers to reduce shifting and spillage
- check the cargo area for objects that could damage containers such as stones, sharp objects, nails
- pesticide containers should be transported in a metal or plastic storage box
- keep pesticides separated from passengers
- carry necessary safety equipment to handle a spill

It is essential that good safety practices be in place for pesticide storage.

It is unlikely that the technician will have anything to do with the construction of a pesticide storage building however knowing what the requirements are is important

- the pesticide storage area needs to be a separate storage area
- regardless of the size, it needs to be a well designed area, secure, with a highly visible warning sign, well ventilated, well lighted, where water damage will not occur and heated if liquid pesticides will be stored and there is the potential to freeze
- protects people and animals from exposure from the pesticides
- reduces the chances of environmental contamination from the pesticides
- prevents damage to pesticides from temperature extremes and excess moisture
- safeguards the pesticides from theft, vandalism and unauthorized use
- when not in use keep the pesticide storage area locked
- post highly visible signs to alert people that pesticides are stored inside
- all entry doors to a pesticide storage area must have
Safe handling - safe practices summary

Once a technician has taken responsibility for a pesticide the “safe handling” responsibility must be carried out throughout the complete cycle. From the initial pick up of the pesticide containers, to the storage and transportation in the vehicle, the mixing, application and the safe return to the storage area.

- Never leave any pesticide or pesticide container off site.
- Do not leave any leftover pesticide with a homeowner to be applied at a later date.
- Empty containers must be stored on the vehicle until they can be properly disposed of.
- Keep all pesticides in their original containers and routinely inspect your pesticide containers.
- When possible use the original label or if required, use a replacement label and attach it to the new container. Unlabelled pesticides are dangerous and illegal. Without the label, it is hazardous and impossible to know what the pesticide is or how to handle it safely. If required, replace the original container with a similar container properly labeled.
- Never store a pesticide in any container that was previously used to hold food or beverages. It is possible that someone, a child, may mistakenly swallow the pesticide assuming that it is drink or food and a poisoning may result.
- Any empty metal, plastic or glass pesticide container must be promptly triple-rinsed or jet rinsed before taking them to a pesticide container collection site for recycling.

Application equipment

- Check for structural defects in the application equipment – cracks, punctures, loose fittings
- Always carry equipment that can make repairs

Pesticide storage

A technician should be aware of how the storage facility sits in relation to potential drainage routes to avoid water contamination, water flooding from run off or spilling out into the water course or to ground water.
Storage requirements and good practices

The technician should be aware of Ontario storage requirements and good practices as described below:

- the storage area should have metal or plastic shelving sturdy enough to handle the quantity and weight involved
- the pesticide containers should fit properly within, not over the shelves, to prevent an accidental spill
- the heaviest containers and liquids should be placed on the lower shelves
- large drums and heavy bags are recommended stored on plastic pallets on the floor
- certain pesticides groups (i.e. insecticides and herbicides) are to be stored separately to avoid any possibility of cross contamination
- when in the storage area, generally inspect other pesticide containers for leaks or corrosion

Tidiness/organized

Pesticide safety and tidiness in a pesticide storage area is the joint responsibility of the employer and authorized employees who use the area (e.g. the technician). A pesticide storage area kept in an orderly manner protects the users and the environment.

Make certain that your actions will maintain the area in good repair and in a clean and orderly manner and that you take sufficient precautions to prevent any pesticide from contaminating any other pesticide in the same area, people using the area and the natural environment. The technician needs to keep the area clean, tidy and clean up any spills.

Labels

It is the responsibility of the technician to keep their container labels visible and legible. Make certain that all pesticides in the storage room are properly labeled. If the label is damaged affix a replacement label to the new container. Unlabelled pesticides are dangerous and illegal.

Without the label, it is hazardous and impossible to know what pesticide is or how to handle it safely. If a label becomes destroyed or damaged immediately mark the container with basic information – trade name and common name, active ingredient, and classification. It would be prudent to have duplicate copies of labels available in case of such emergency.
MSDS

Keep Material Safety Data Sheets (MSDS) available for every chemical in the storage facility. Check the MSDS for types of material that are needed to deactivate spills as well. In addition, label all items used for handling pesticides – measuring utensils, protective equipment to avoid cross contamination and prevent their use for other purposes.

Replacement containers

Store pesticides only in their original containers or if damaged in a similar container and write on the container – the trade name, Pest Control Products Act Registration Number (PCP) active ingredient(s).

Never use or store a pesticide in any container that was used to hold food or beverages for personal consumption i.e. – milk jugs, pop bottles, food containers.

Never keep any food, drink, seed, animal feed, veterinary supplies, and clothing in the pesticide storage room. These items could become contaminated by pesticide vapors, dust, or spills resulting in accidental exposure.

Keep containers securely closed

Keep containers securely closed to prevent spilling or dry formulations from clumping. Open bags of wettable powders, dry flowables, dusts, and granules can be placed into sealable bags or other suitable containers to reduce moisture absorption and prevent spills.

Know location of protective equipment

Know the location were personal protective equipment is kept uncontaminated outside the storage room for an emergency clean up.

Safety equipment

How to reduce your pesticide exposure risk:

- keep adequate respiratory protection and protective clothing, equipment, (e.g., goggles, respirators aprons, boots, and spill protection equipment) immediately outside the storage room (to prevent contamination) for emergency purposes
- wear the appropriate protective equipment when handling pesticide containers and if required to clean up a spill
- know the location of a nearby water source and eye wash station in the event of an accidental splash and for hand washing as needed after pesticide contact
- there should be clean water should be available for decontamination
- maintain spill protection equipment nearby
- a shovel and broom
- garbage bags,
- fire extinguisher rated for chemical fires,
- absorbent material such as kitty litter in case of a spill

- emergency telephone numbers easily accessible
- first aid equipment appropriate for the type of pesticides found on the premises

<table>
<thead>
<tr>
<th>Spills clean up procedure</th>
<th>If you find any damage and a pesticide spill, immediately put on the appropriate personal protective equipment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containing a spill or leak</td>
<td>The technician must take immediate action to prevent further leaking and spreading of the pesticide. Have clay, fine sand, activated charcoal, vermiculite or similar absorbent material readily available to contain any spills or leaks. Keep a shovel, broom and heavy duty plastic bags available in case a dry material needs to be cleaned up.</td>
</tr>
<tr>
<td>Clean up</td>
<td>Clean up the spill and dispose of the pesticide correctly. It may be necessary to wash down the contaminated area with water. Unless the drain goes to a holding tank the storage area should not have a floor drain. Check that there is a holding tank before washing down the affected area. If there is no floor drain and the area needs to be washed down be prepared to clean up the “wash” with clay, fine sand, activated charcoal, vermiculite or similar absorbent material.</td>
</tr>
<tr>
<td>Disposal options</td>
<td>In all cases of a pesticide spill, check with your supervising licensed exterminator for detailed instructions on clean up and disposal. Depending on the situation, disposing of the pesticide from a spill could include:</td>
</tr>
<tr>
<td></td>
<td>• use the pesticide immediately at a site following all label requirements</td>
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<td></td>
<td>• transfer any pesticide that is to be kept to an appropriate container that can be tightly closed and label the new container with the appropriate information – it is possible to get new labels from the manufacturer</td>
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<tr>
<td></td>
<td>• place the damaged container and its contents into a suitable larger container for appropriate disposal as soon as possible</td>
</tr>
<tr>
<td>Empty containers and old stock</td>
<td>Every time a pesticide is used, the problem of how to dispose of empty containers and leftover pesticide tank</td>
</tr>
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</table>
mixture exists. Anyone who stores pesticides may have to dispose of old stock or the chemicals from a damaged container. You can prevent environmental damage and possible human poisoning if you take the time to follow proper disposal procedures and are not careless when disposing of empty containers, leftover spray mixtures, or surplus pesticide concentrates.

**Proper disposal**

Correct pesticide container disposal is important because:

- improperly rinsed containers may not be recycled
- pesticide residues in unrinsed containers are hazardous to people (e.g. children could play around the containers and be poisoned)
- pesticide residues could contaminate the environment (e.g. rain could wash container residues into a stream and kill fish or other aquatic organisms)
- improperly rinsed containers may not be recycled
- pesticide residues in unrinsed containers are hazardous to people (e.g. containers could be used)
- pesticide residues could contaminate the environment (e.g. rain could wash container residues into a stream and kill fish or other aquatic organisms)
- poor container disposal practices create a bad public image (e.g. customers who see sloppy disposal practices may refuse to carry on future business)
- poor disposal practices waste pesticides and money (e.g. several dollars worth of pesticides may be lost if the pesticide container was not emptied completely)

**Rinsing containers**

Even drained pesticide containers are not really “empty.” They still hold about one percent of the original amount of pesticide. Although this figure may appear insignificant, these residues still can be hazardous to humans, animals, and the environment.

Containers must be promptly triple or jet rinsed. The rinse water should be put into the spray tank and used in the extermination.

**This practice:**

- removes the pesticide residue from the container before it has dried (making it difficult to empty and rinse)
- minimizes the pesticide residue
- reduces the hazard to people and the environment, and
- avoids creating a disposal problem
Do not triple-rinse or pressure rinse containers if the pesticide label indicates that the container should not be rinsed.

**Triple rinse technique**

Use either the triple-rinse technique or a specially designed device for rinsing containers described below.

1. Triple rinsing requires the rinsing of each container three times as you are filling the spray tank.
2. Fill the empty container at least 10 per cent full of the diluent (usually water) and recap.
3. Shake the recapped container or roll the container so that the inside surfaces of the container are well rinsed.
4. Pour the rinsings into the spray tank.
5. Repeat steps 2 to 4 two more times.

Remember to check the container after you have finished rinsing. Make sure that the pesticide has not been left behind as a cake or paste on the bottom of the container.

Paper or cardboard containers are often rigid enough to withstand rinsing. If possible, triple-rinse these containers as you fill the tank and put the rinse water into the spray tank for use on the application site.

**Rinsing devices**

Rinsing devices (e.g. jet-rinsing) use pressurized water to clean out the container. They are just as effective as triple rinsing and take less time. Follow the manufacturer's instructions. Most require that the pesticide container be rinsed for 60 seconds. Pour the rinsings into the spray tank.

**Crush or puncture containers**

Empty containers should never be re-used except to put in the same or a similar product. Even if the containers are triple rinsed, there is always a risk that the remaining residues in the containers may contaminate foods or drink for animals or humans. Never give empty, rinsed containers to anyone. Once containers are properly rinsed, they should be punctured and/or crushed so that they cannot be used again. Make certain the rinse water is out of the container.

Glass containers can be broken in a plastic bag which then must be properly disposed. This step prevents anyone from using the container for things such as a water bucket, harvesting container, sand pail, etc.
**Triple rinse empty containers and recycle**

Empty containers that are approved for rinsing should be triple-rinsed and taken to an approved pesticide container depot for recycling. In cases where a depot is inaccessible, triple-rinsed containers may be taken to the landfill.

In some municipalities, landfill operators do not accept empty pesticide containers. Before transporting your empty containers to a landfill, contact the landfill operator for what is permitted for disposal.

**Store containers in a safe place**

It may be more convenient to store empty, rinsed containers until you have collected enough to make a trip to the recycling Pesticide Container Depot or an approved waste disposal site worthwhile. If you store containers, keep them in a dry secure location until you can dispose of them properly.

**Plastic, glass or metal containers**

An empty plastic, glass or metal container that has been used to hold a Class 1, 2, 3 or 4 pesticide must be handled and disposed in the following manner:

- Return the container to the vendor for refilling if the container:
  - is marked to indicate that it can be refilled with the same pesticide, and
  - was stored in the manner that would be required if it were full

  or

- Triple-rinsed or jet-rinsed using clean water or another appropriate solvent unless:
  - the label indicates that the container should not be rinsed
  - the container is an aerosol can, or
  - the container does not have an opening that can be readily opened and is large enough to permit rinsing

- Place rinsings into the spray tank to be used in the extermination and

- Take the container to a Pesticide Container Depot for recycling.

  or

- Take the container to a Ministry of Environment (MOE) approved waste disposal site (contact your local municipal office for the disposal site location).
Paper or cardboard containers

An empty paper or cardboard container that has been used to hold a Class 1, 2, 3 or 4 pesticide must be handled and disposed in the following manner:

- Take measures to ensure that the bag or container is empty.
- Place any residue into the spray tank and use it in the extermination.
- Burn the bag or container (if allowed by municipal by-laws) so that persons and animals are out of any resulting smoke and that any resulting smoke is directed away from buildings, roads and outdoor areas frequented by the public.
- Take the container to a Ministry of Environment (MOE) approved waste disposal site (contact your local municipal office for the disposal site location).

If burning

If you burn a paper or cardboard container, be very careful around the smoke. It may contain toxic fumes from the burning pesticide. Be certain that there is no chance that a person or animal may breathe in this smoke. Make sure that the smoke does not drift toward buildings, roads or any outdoor areas frequented by the public.

Locating a pesticide container depot

The Ontario Pesticide Container Recycling Program is available to commercial exterminator, licensed operators and growers. Through this program, clean, triple rinsed, plastic or metal pesticide containers (maximum 23 litre plastic containers and 20 litre metal containers) can be returned to Pesticide Container Depots located throughout the province. For information on Depot locations, please contact your local licensed pesticide vendor.

Surplus tank mix

Try to avoid having any surplus tank mix (i.e. leftover pesticide) after you have finished applying pesticides.

Surplus tank mix is any pesticide remaining in the spray tank at the conclusion of the extermination. **Surplus tank mix that will no longer be used for its original purpose is considered as “waste”**. The collection, handling, transportation, storage, processing or disposing of these wastes is strictly regulated in Ontario.
Disposing of a surplus tank mix

Disposing of surplus tank mix costs money and can pose disposal problem. To avoid surplus tank mix, follow these guidelines:

- check all the information on the pesticide label before mixing the pesticide solution
- make sure you have identified the pest problem properly and selected the right pesticide (This will prevent having to dispose of a tank-load of the wrong pesticide.)
- check the application rate, the size of the area that needs the pesticide application, and the output of your sprayer
- calculate the amount of spray solution carefully
- make sure that you mix only enough pesticide that can be applied that day

How to use a surplus tank mix

Before applying any pesticide, read the pesticide label for specific instructions. Information on the label may include how to use surplus tank mix. If you have surplus tank mix, you may apply it according to label directions to another area that requires a treatment with this pesticide. This treatment area must have a pest problem specified on the pesticide label and the pesticide product must be applied according to the label directions.

Restriction

Never re-spray the treated area with surplus tank mix.
Spraying an area twice will double the application rate. This may harm desirable vegetation, or cause illegal pesticide residues in the treated area.

Storage of diluted pesticides

Diluted pesticides often lose their effectiveness rapidly. Consult your pesticide dealer to determine if the diluted pesticide can be stored and if so, under what conditions. Pesticides diluted in water may freeze in the winter resulting in damage to storage containers and possible loss in effectiveness.

The storage of diluted pesticide for use at some later date is not recommended.
If you have pesticide concentrate that you no longer need or can't use, be sure to dispose of it safely. Pesticides that are no longer to be used for their original purpose are considered as “waste” and must be disposed of properly.

Disposal of a pesticide concentrate

The collection, handling, transportation, storage, processing or disposing of these wastes is strictly regulated in Ontario. Avoid waste disposal by accurately measuring the area to
be treated; measuring the correct amount of pesticide for the application and purchasing only enough pesticide to do the job.

If you have excess pesticide concentrate, take the following steps:

- Contact the supplier. It is sometimes possible to return unused pesticide if it is still in its original container.
- Contact a waste disposal company approved by the Ministry of the Environment to handle hazardous wastes and arrange for disposal. Look in the Yellow Pages of your telephone directory under “Liquid Waste Removal.”

**Damaged container**

If a container which held a Class 1, 2, 3 or 4 pesticide is damaged or broken, the container must be emptied and disposed in the manner described above (see Disposal of Empty Pesticide Containers). Any pesticide to be kept must be put into a secondary container (see Secondary Container description below). Any resulting spill must be disposed of according to Part V of the *Environmental Protection Act* as well as any clean-up material, water or solvent used in the decontamination (see Spills in the Emergency Response section).

**Secondary container**

If you have a pesticide that is still usable but the container is damaged, you must place the pesticide into a secondary container that is equivalent (i.e. same type and composition) to the original container. The secondary container must have a pesticide label denoting the trade name or common name, concentration of each active ingredient in the pesticide and the pesticide’s registration number under the *Pest Control Products Act* (Canada) or the Fertilizers Act (Canada).

**Summary**

*A Technician has a responsibility in implementing*

- safe practices for transporting pesticides
- safe practices for storing pesticides
- safe practices for disposing of pesticides and pesticide containers

*technicians need to protect themselves, others and the environment*
A Technician must:
- transport pesticides separately from other commodities in a manner sufficient to prevent their contamination by the pesticide
- initiate the appropriate response could mean the difference between a minor leak and a disastrous spill
- help prevent pesticide accidents and exposures in storage areas
- follow any label directions destined for disposal
- make sure all empty containers are triple rinsed or pressure rinsed before being stored for storing or disposal

The Pesticides Act and Regulation 63/09 can be purchased from Service Ontario, at www.serviceontario.ca or downloaded at no cost from the website at http://www.e-laws.gov.on.ca.
Learning Objectives

After reading and studying this section you should know:

- the common types of pesticide application equipment and the risks associated with use
- that differences exist between hand sprayers
- that hand sprayers require regular maintenance and replacement of parts
- how spreader misapplication can be reduced or prevented
- the basic working components of a power sprayer
- the purpose of a shut-off or control valve
- the importance of equipment calibration records

Reduce risks of power sprayer spill

You should know the location of the engine kill switch to stop the sprayer’s pump and location of all shut off valves from the spray tank to the gun or wand nozzle to reduce pesticide spill risks. In case of a leak or rupture close shut off valve before and after location of leak.

It is important to check all hoses and connections regularly for wear to prevent accidental discharge.

The importance of spill containment and safety procedures to reduce pesticide risk is addressed in greater detail in Section 12 on “Spills”.

Reduce risks of spreader spill

Make certain your spreader’s discharge setting is accurate and the shut off lever is in excellent working order. Sweep up any product from non target areas (e.g., driveways, sidewalks) and place back into the hopper.

Never fill the spreader on a grass area so that tipping and burning caused by a spill is prevented. Use gloves to handle any recovered accidental product spills from grass and other areas to prevent property damage.

Prevent drift

You should never apply a pesticide spray when wind conditions, high temperatures or humidity can cause vapour or spray drift to damage property, and impair public health, safety and the environment.
The applicator must have control of the product and keep it on target. A pesticide applicator must stop all spray operations when unacceptable weather conditions arise. This responsible action can save you and your employer expensive environmental damage claims.

**Reduce water contamination**

Never fill pesticide equipment from any body of water (e.g., well, lake or river or other surface source) without taking steps to prevent back flow. To prevent ground water contaminations through leaching never spray to the edge of a body of water or well. Always leave an area of unsprayed vegetation, called a buffer zone, to reduce the risk of pesticide runoff, leaching or drift.

Never wash any spraying equipment near a body of water. Take extreme care when applying a granular or liquid pesticide near ponds and swimming pools so as not to contaminate the water. Any pesticide contamination to these waters can kill valuable pond plant life and fish or make the swimming pool water unsuitable for use without costly cleaning and refilling.

**Selecting the right application equipment**

A Technician **cannot** select equipment. It is the responsibility of the supervising licensed exterminator to properly select equipment for the work that is to be performed. It is the technician’s responsibility to ensure that the calibration rate established by the supervising licensed exterminator is maintained.

**Industry hand sprayers**

Some examples of common hand held sprayers are pressurized aerosols, pressurized cylinders (commonly called micron air injector void applicators), trigger pump sprayers, hose end sprayers, back pack sprayers and compressed air-sprayers. This equipment is highlighted in Table 9.1 in the supplement at the end of this chapter.

Hand sprayers are widely used by the structural, land and aquatic licensed industry and are discussed below in more detail.

**Pump pressure is applied to the tank**

Most commercial hand sprayers operate on the principle of **compressed air supplied to the tank** by a hand operated
pump. The hand sprayer's output application rate can vary greatly depending on the pumped pressure, spray pattern, nozzle orifice size, and walking speed of the applicator. These sprayers are designed to apply a small quantity of pesticide to a treated surface area to reduce pesticide risk.

**Wettable powder (WP) needs agitation**

It is important to note that all hand sprayers using a wettable powder (WP) require that the sprayer’s tank undergo frequent shaking (agitation) to keep the WP formulated product in suspension during the pesticide application.

**Hand sprayers**

Hand sprayers used by structural applicators to apply a liquid spray to control insects are different than those used in land/aquatic activities.

This equipment usually has a stainless steel tank and always provides a positive shut off at the spray nozzle.

**Positive shut-off**

The spray wand contains an inner wire from the trigger to the spray tip. Safety features include an industry standard small orifice multi-spray tip with an in-line filter screen before the trigger, in addition to a pre-nozzle filter screen.

**Multi-spray tip**

This multi-spray tip nozzle is designed to apply a consistent fine flat spray pattern for fast drying on indoor surface, a pin spray for voids or a crack and crevice attachment for small openings.

The structural hand sprayer system has an average working pressure and application speed. This allows many of the structural product labels to specify an amount of pesticide product that can be added to the tank.

**Differences in equipment**

Understanding the differences between hand sprayers and their use can reduce pesticide risk and product misapplication.

Typically these sprayers used in applying pesticide products for land or aquatic purposes use a much larger droplet thereby reducing drift. The version of the hand sprayer commonly purchased at a local hardware store uses an adjustable twist mechanism to create a range from a heavy pin point stream to a wide cone spray pattern similar to the garden hose spray nozzle gun.
The “commercial” version of hand sprayers usually allows the user to interchange nozzle spray tips.

**Not for indoor use**

In commercial land/aquatic pest control activities hand sprayers are usually used for spot treatments or occasional specialty work. Hand sprayers intended for use outdoors are not designed for indoor application and should never be used indoors.

Hand sprayers that are separately maintained for spot treatment of weeds, insects, and vegetation control should have their specific use and contents labeled to avoid an accidental pesticide misuse.

Never use a sprayer for a different purpose unless instructed to do so by your supervising licensed exterminators. Always take appropriate precautions to clean and eliminate all previous pesticide residues in the hand sprayer.

When changing pesticides it is recommended that a tank cleaning product be used.

**Hand sprayer general maintenance**

All hand sprayers require routine maintenance and parts replacement, including regular cleaning of the in-line filter screen and/or nozzle filter screen to maintain safe and proper working order.

Visually inspect your sprayer’s main working component parts before use or once daily. Replace parts as necessary (e.g., gaskets, rubbers, and seals) to prevent a misapplication of a pesticide formulation.

Always refer to your particular hand sprayer’s leaflet and parts list for helpful maintenance instructions and/or trouble shooting guidance.

Never use your mouth to remove a contaminate clogging the spray tip or to clean filter screens. Use an air pressure hose.

**Broadcast spreader**

The broadcast spreader is the most popular piece of application equipment used to apply a granular pesticide formulation. Granular formulations are often used within the commercial pest control industry as an alternative to liquid pesticide formulations to provide a needed residual
pesticide to control weeds and insects.

**General features**

The broadcast spreader includes a hopper that holds the granules, which are delivered through an adjustable discharge gate’s opening to a rotating disc. The coverage width depends on the discharge gate’s opening and the equipment’s speed of travel, or when a hand held unit is used, its rotating crank speed.

**Treating small areas**

The most common granular pesticide application equipment to treat small land areas is the hand-pushed broadcast spreader.

Spreaders that apply a pesticide must be product and applicator calibrated to ensure compliance with the label’s application rate.

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**Under O. Regulation 63/09 a Technician is prohibited from calibrating any pesticide application equipment.**

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**Spreader calibration**

Calibration is the responsibility of your supervising licensed exterminator. Calibration is commonly done using a 10 kg bag of fertilizer or similar particle size to determine the spreader’s correct maximum discharge (chute) opening size. It is only the hopper’s actual known maximum discharge (chute) opening and ground speed that accurately determines the correct kg/100 m2 label application rate.

**Check setting**

A technician should always visually make certain that the spreader’s maximum discharge (chute) opening is set to the position approved by his or her supervising licensed exterminator before applying the pesticide. Before use or when in doubt, always check the equipment log book for the spreader’s correct discharge gate setting for any particular product or contact your supervising licensed exterminator.

Never rely on a spreader’s dial readings. Frequently, similar readings on various spreaders reflect different actual discharge (chute) openings.

**Spreader maintenance**

Spreader misuse and improper maintenance can cause considerable financial loss to your employer. Applying a granular pesticide with an improperly calibrated spreader can cause serious and expensive property damage, (i.e., to
restore fish ponds, swimming pools, repair lawns, gardens, flower beds or around structures), in addition to impairing the environment and creating a public health and safety pesticide risk.

**Check the discharge mechanism**

As a technician, you have a responsibility to make certain that your spreader’s control mechanism and components are visually examined and tested to be in excellent operating order before use. **Never use a spreader that is not in good working condition.**

**Wash daily**

Proper maintenance and washing daily after use will extend the spreader’s life.

**Power sprayers**

The most common motorized sprayers use a pump that is power-driven by a battery, vehicle drive shaft, power take off (PTO), or small gas engine to provide pressure to the hose rather than to the tank. They are commonly referred to as “power sprayers”.

**Low-pressure sprayers**

The most common of these power sprayers is the Low-pressure sprayer used in agriculture, forestry, industrial vegetation, landscape and to a lesser extent by those engaged in commercial structural or aquatic activities.

**Low and ultra low volume air sprayers**

Other types of common motorized spray application equipment includes Low-volume and Ultra-low volume (ULV) or ultra-low dosage (ULD) machines commonly referred to as “fogging equipment”. These machines produce a “suspension in air”. This equipment “atomizes”, or breaks down, a liquid into tiny droplets producing an aerosol or ULV. More than 90% of the droplets are under 20 microns in size.

**A technician cannot use a Class 3 pesticide as a suspension in air for a structural extermination unless directly supervised** by a licensed exterminator.
ULV equipment is often used for the large scale applications of insecticides as a fog (dry) or mist (wet) and sometimes as a spray. This use typically occurs in warehouses under strict label instructions and use restrictions.

The misuse of fogging equipment by untrained personnel presents one of the highest pesticide risks to the technician, public health and safety, and the environment.

The hand held ULV fogger is the most commonly used in non-dwelling structures, unused residential attics or wall voids with an attached crack and crevice device to reduce pesticide risk,

- Never use this equipment to apply a space spray in a residence.
- Never use a fogger without wearing an appropriate respirator.

This equipment often uses ULV labeled pesticide products with restricted uses, in addition to “domestic” aerosol chemical products purchased in commercial quantities (i.e., 20 litre pails).

### Power sprayer parts

#### Tanks

Power sprayer tanks are usually made of fiberglass, polyethylene or stainless steel with a measuring scale imprinted on the tank end to assist the applicator to read and determine the fill quantities. The power sprayer tank must have a pesticide Warning-Storage sign attached as specified in Regulation 63/09.

#### Lid and tank filler screen

The tank opening requires a lockable lid under the requirements of Regulation 63/09 and may have a tank fill filter screen.

#### Pumps

Various types of pumps are used - roller, centrifugal, diaphragm, and piston pumps. Regardless of the type, the pump must provide the right volume of liquid to the nozzles, and if applicable to the agitator, at the same time as it maintains the desired pressure.

#### Suction hose

The suction hose drawing liquid from the tank bottom is
usually a reinforced hose at least as large as the pump intake opening.

Maximum pressure and flow
Pressure hoses and fittings from the pump to the reel must handle the maximum flow and pressure that can be developed.

Agitation systems
Power sprayers use three main types of agitation systems:

- **Mechanical agitation** - uses paddles attached to a shaft mounted near the bottom of the tank to retain product in suspension -necessary when commonly using WP product formulation. This type of agitation assures proper mixing for all liquid spray formulations.

- **Jet agitation** - uses a separate return line with an attached working part located at the bottom of the tank called a jet agitator to increase liquid turbulence to retain product suspension. This system can be used for limited occasional wettable powder use.

- **Hydraulic agitation** - usually uses the pressure regulator valve as a return by-pass line to the tank. This is the least effective agitation system suitable only to agitate EC formulations.

Pressure regulator
Pressure regulators control the maximum hose and output pressure and quantity of spray material delivered by the lawn care and structural industry’s spray gun or wand. Numerous types of pressure regulators exist. A pressure regulator’s bypass or return line should be without restriction and capable of discharging the total pump output if used as the agitation line.

Pressure relief valve
The pressure relief valve is one kind of regulator that is generally set to allow the tank liquid to by-pass when hose pressure exceeds the pre-set maximum discharge safety guidelines (e.g., 700 kPa) of a hose if a separate agitation line is used. The pressure relief valve prevents a pressure build-up that exceeds the hose kPa pressure rating that can result in a needless hose burst that could impair public health and safety and the environment.

Filters and screens
Filters and screens are essential parts of a proper working sprayer system. Clogged nozzles are most often the result of an improper filtering system or failure to provide proper maintenance.
Common filter types

**Tank fill screens** - located at the tank fill opening to remove large contaminants from entering the tank and prevent later in-line damage of the spray system.

**Suction line filters** - located in-line usually at the bottom of the tank and before the pump, to catch contaminants or product residue not properly mixed from reaching the pump. The main purpose is to prevent component parts damage and serious clogging of the nozzle tip and misapplications.

**Pressure in-line filters** - located after the pump usually before a gun or wand trigger and its nozzle to filter out finer “contaminants” to stop serious wand mechanism “damage” and nozzle orifice clogging and pesticide misapplication. These are generally used in combination with main suction line filters.

Power sprayer discharge attachments

All power sprayers have a discharge mechanism that may include a wand, spray gun, or boom with attached spray nozzles. These attachments can vary considerably with countless nozzle orifice size configurations and various spray patterns.

All spray discharge attachments have one or more nozzles selected to deliver the spray at the appropriate volume, angle and distance.

Functions of nozzles

Nozzles serve three (3) main functions:
- breaking the liquid into droplets
- spreading the droplets in a specific pattern (e.g., cone, flat spray)
- regulating the rate of the spray output
DESCRIPTION OF MAJOR COMPONENTS

Description of major components

The major components in respect to this typical diagram are explained in simple layman terms on the following pages.

Sprayer tank

The tank is the reservoir for the pesticide solution. The tank must have a pesticide storage sign posted on it.

Tank cover lid

Tank lid covers the opening at the top of the spray tank and must be locked if left unattended.
Tank filter screen

Tank filter screen is located below the cover lid when using small orifice spray tips.

Tank saddle

Tank saddle commonly holds the spray tank with sufficient clearance above the vehicle bed for the plumbing, and has mounting bolt holes which attach the sprayer unit to the truck or trailer. Two adjustable straps are standard to secure the tank in the saddle to prevent movement.

Tank reservoir drain

The tank reservoir drain is located at the bottom of most tanks to allow for safer pesticide draining, cleaning and decontamination. The outflow bulkhead fitting is located in the centre of this reservoir drain. This fitting comes complete with an inner and outer tank gasket to prevent leakage. Gaskets should be replaced at the first sign of deterioration to prevent a pesticide leak. The internal flow opening size fitting is usually not less than the intake of the pump’s port size (e.g.-3/4”). This is where the tank’s outflow suction line starts. Plumbing is threaded into the outflow bulkhead fitting towards the pump direction and includes a ball valve shut off directly after the inserted elbow, followed before the pump by an in-line suction strainer more commonly called a filter.

Suction strainer (filter)

The suction strainer must be installed correctly with the flow directional arrow going toward the pump as marked on the filter to properly function. Shut off valves are located on both sides of the filter to cut off any pesticide flow to allow for safe cleaning.

Ball valve – shut offs

Ball valve – shut offs are designed for fast shut off to prevent or minimize a pesticide spill and allow safe pesticide cleaning or repair of the sprayer’s components. The first important shut off valve is located immediately after the suction bulkhead. An easily accessible and lockable shut-off ball valve is commonly located before the pump to close any flow from the tank.

Unions

Unions are commonly located in close proximity to the pump’s intake and output ports for easy pump removal, and to make other component repairs easier and safer, with reduced pesticide exposure.

After the pump, the following are major components found in common low-pressure power sprayers to eliminate or
minimize potential pesticide risks:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure relief valve</td>
<td>Pressure relief valve with an attached bypass hose line that discharges back into the tank before the hose can exceed its maximum working pressure rating. This relief valve is preset by the supervising exterminator according to the hose pressure rating and work being performed. Pressure relief valves come in various manufacturer’s pre-set maximum safety ratings to discharge fluid back into the tank.</td>
</tr>
<tr>
<td>Pressure gauge</td>
<td>Pressure gauge is an instrument that indicates to the applicator the hose’s working pressure (a technician must pay attention to its readings, and follow the supervising exterminator’s instructions in respect thereto).</td>
</tr>
<tr>
<td>Jet agitation system</td>
<td>Jet agitation system has a separate bypass agitation line with a control valve to a jet agitation system. The actual agitator is always located near the bottom of the tank and increases turbulence within the tank to commonly keep emulsifiable pesticides in suspension. This agitation system is not suitable for regular wettable powder use.</td>
</tr>
<tr>
<td>Ball valve shut off</td>
<td>The hose pressure line has a fast shut off ball valve going to the hose reel and hose to safely cut off pressure in event of a hose burst, rupture or leak.</td>
</tr>
<tr>
<td>Quick disconnect (coupler)</td>
<td>Quick disconnect coupler with an internal shut off valve is commonly used at the gun or wand hose end to allow for a safe connection or disconnection.</td>
</tr>
<tr>
<td>Gun or wand</td>
<td>Gun or wand always has an instant shut off valve or trigger, and uses an in-line pre-filter in conjunction with small orifice spray tips. A nozzle filter screen is always present behind any sprayer discharge attachment that uses a small orifice spray tip.</td>
</tr>
</tbody>
</table>

Never use your mouth to clean a spray tip, filter screen or sprayer components. Always use air pressure.
Learning Objectives

However, after reading this section you should obtain a better understanding of:

- the importance of record keeping
- what your supervising licensed exterminator must consider in order to select the right equipment
- common hand held pesticide application equipment;
- the difference between boom and boomless sprayers
- the difference between Low-volume and Ultra low-volume (ULV) air sprayers

Record keeping can prevent pesticide miscalculations and misapplications

The recording of your equipment’s calibrated coverage area (e.g., when using a power sprayer and granular spreader) in an equipment application log book can prevent you from miscalculating during pesticide mixing or misapplication when applying the pesticide.

Application logbook

An application log book used to record tank fills or the number of granular bags applied can assist in determining the cause of a pesticide misapplication when matched with the technician’s completed on file job work orders. The log book should also record all seasonal tank fills or partial fills, date and time, vehicle license number, applicator’s name, added pesticide product amounts with PCP registration number, and weather conditions.

Benefits

This tank fill or granular bag information can also verify adherence to product label rates by adding the completed square metre coverage area or may indicate the need for equipment re-calibrations and or additional technician specific training by your supervising exterminator.

What your supervisor considers in order to select equipment

Equipment for applying pesticides can vary from hand held sprayers and dusters to sophisticated truck mounted ultra low volume (ULV) computerized foggers, multiple-nozzle farm sprayers and aircraft mounted units.

The selection of equipment is based on the following:

- type of pest
- pesticide formulation
• the label recommended method of application
• location
• risks of exposure to the public and the environment
• size of area to be treated

The even application of a pesticide is critical to obtain optimum results, avoid property damage, and reduce public pesticide risk.

Applicator responsibility

It is the applicator’s responsibility to ensure that all pesticide application equipment delivers the accurate amount of a pesticide product correctly according to label instructions.

Your supervising licensed exterminator will select the proper equipment but it is your responsibility to maintain the pesticide application equipment in excellent working order, and to keep accurate log books with complete service information.

Always attach a label or tag to your hand equipment to identify its content, i.e. pesticide trade name, PCP registration number, active ingredient(s), solution percentage.

Types of equipment tables

See Table 10.1 ‘Common Hand Held Pesticide Application Equipment’ on page 3

See Table 10.2 ‘Two Common Motorized Sprayers’ on page 4

See Table 10.3 ‘Two Low-volume and Ultra low-volume air sprayers’ on page 5
## TABLE 10.1 Common Hand Held Pesticide Application Equipment

<table>
<thead>
<tr>
<th>Common Examples</th>
<th>General Features</th>
<th>Comments and Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aerosols</strong></td>
<td>• non-reusable or refillable&lt;br&gt;• some designed to fit a crack and crevice injection system</td>
<td>• spray easily drifts off-target unless a crack and crevice device is used</td>
</tr>
<tr>
<td>pressurized cans</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Micron air injector void applicators</strong></td>
<td>• refillable - air pressurized&lt;br&gt;• usually fitted with an attached flexible hose and trigger</td>
<td>• commonly uses crack and crevice nozzles to reduce off-target pesticide risk</td>
</tr>
<tr>
<td><strong>Trigger pump sprayers</strong></td>
<td>• pressure squeezing the trigger pulls pesticide up to the nozzle</td>
<td>• spot treatment, i.e., indoor plants, easily drifts off-target</td>
</tr>
<tr>
<td><strong>Hose-end sprayers</strong></td>
<td>• vacuum draws a set selected rate of concentrated pesticide from a container to mix with water in a garden hose</td>
<td>• residential “domestic” lawn care with concentrations of up to 12.5% of active ingredients&lt;br&gt;• spray easily drifts off-target</td>
</tr>
<tr>
<td>least accurate spray method</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Compressed-air sprayers</strong></td>
<td>• uses a hand operated pump or an airline hose to insert air pressure above a pesticide tank mixture to force the liquid out of the tank through a hose and filtered spray tip nozzle when the sprayer’s wand trigger is squeezed</td>
<td>• spray pressure and output rates can easily fluctuate&lt;br&gt;• insufficient agitation to keep a pesticide in suspension (spray tank requires regular shaking—especially if using a wettable powder formulation)</td>
</tr>
<tr>
<td>Hand or Backpack models&lt;br&gt;differences noted below</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>for interior use</strong>&lt;br&gt;(structural)</td>
<td>• features a standard multi-spray tip, uses a flat spray pattern with a small orifice&lt;br&gt;• wand has a positive shut off at the nozzle spray tip</td>
<td>• a primary purpose hand sprayer that is used by the structural industry for spot or broadcast insect control</td>
</tr>
<tr>
<td><strong>for exterior use</strong>&lt;br&gt;(land/aquatic)</td>
<td>• no industry standards exists&lt;br&gt;• applies a larger droplet size&lt;br&gt;• not suitable for indoor use</td>
<td>• a secondary purpose sprayer usually used for spot treatment or occasional small area land/aquatic work</td>
</tr>
<tr>
<td><strong>Bait gun applicators</strong></td>
<td>• a mechanical device used to apply a gel bait from a tube using a small injection tip</td>
<td>• a safer and superior control method than sprays for some insects i.e. roaches and ants</td>
</tr>
<tr>
<td><strong>Bulb or bellow dusters</strong></td>
<td>• uses air to push a dust formulation out of a nozzle</td>
<td>• dusts easily drift off-target&lt;br&gt;• produces noticeable residues</td>
</tr>
<tr>
<td><strong>Broadcast spreaders</strong></td>
<td>• a granular formulation is gravity fed onto a rotating disc through an adjustable opening that throws the pesticide to a specific width&lt;br&gt;• rate calculated kg/100 m²</td>
<td>• granules easily spread off-target and can be later picked up by children, pets, wildlife&lt;br&gt;• can cause serious damage if granules contaminate water (e.g., fish ponds, pools)</td>
</tr>
<tr>
<td><strong>Wick applicators</strong></td>
<td>• a small quantity of concentrate herbicide is gravity fed from a pipe with a re-sealable opening to a wick, rope or foam pads</td>
<td>• selectively applied to weed growth above turf or plants where no spray drift can be allowed for minimum risk</td>
</tr>
<tr>
<td>Power Sprayers</td>
<td>General Features</td>
<td>Comments/Risks</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>applies a large quantity of pesticides</td>
<td>• has a pump powered by a battery, drive-shaft, power takeoff or small engine &lt;br&gt; • the pump pressure is applied to the hose rather than to the spray tank &lt;br&gt; • ordinarily mounted on a truck, trailer or tractor</td>
<td>• mainly &quot;commercial&quot; use (i.e., Agriculture, Forestry, Landscape, Industrial, Structural, Aquatic) &lt;br&gt; • limited &quot;domestic&quot; use</td>
</tr>
<tr>
<td>examples as follows:</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Low - pressure boomless sprayers</strong>&lt;br&gt;normal working pressure less than 700 kPa (range 0-100 PSI)</td>
<td>• usually fitted with a hose reel, hose and a gun/wand that has an attached nozzle(s) &lt;br&gt; • can spray a wide swath &lt;br&gt; • application rates normally 500-1000 L/ha</td>
<td>• typical use is for spot treatment or broadcast spray over small areas (e.g., residential lawns, termite and spider control) &lt;br&gt; • spray easily drifts off-target</td>
</tr>
<tr>
<td><strong>Low - pressure boom sprayers</strong>&lt;br&gt;normal working pressure 50-500 kPa &lt;br&gt;applies a pesticide over a larger area with less water</td>
<td>• includes booms with fixed spray nozzles attached of various lengths (e.g., 6 m) &lt;br&gt; • application rate 50-500 L/ha &lt;br&gt; • pressure 50-500 kPa</td>
<td>• typical use is for golf courses, parks, estate lots, agriculture, forestry and right-of-way pest control operations &lt;br&gt; • spray easily drifts off-target unless fitted with special spray nozzles and or cover</td>
</tr>
</tbody>
</table>
TABLE 10.3 Low-volume and Ultra low-volume air sprayers

<table>
<thead>
<tr>
<th>Low Volume Air or Aerosol Sprayers</th>
<th>General Features</th>
<th>Comments/Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commonly called “foggers” applies a small quantity of pesticides examples as follows:</td>
<td>• various types- from hand portable to permanent units installed in warehouses to truck mounted with computerized controls • some equipment water and oil base fluids can be used but the fog obtained varies.</td>
<td>• indoor-outdoor applications • indoors -product calibrated in mL /1000 cubic metres (m³) space, outdoors in mL or L/ha • respirator required • small particles can easily drift off-target unless a crack and crevice nozzle is attached</td>
</tr>
<tr>
<td>1. Conventional Aerosol Foggers (Low-volume air sprayer) up to 50 microns</td>
<td>• uses high speed of air to break up the liquid to apply a &quot;mist&quot; of aerosol particles between 20-50 microns depending on the flow meter output and droplet setting</td>
<td>• typical use is for applying aerosol chemical products • to control a wide range of flying insects and apply disinfectants, deodorizers, germicides in structures</td>
</tr>
<tr>
<td>2. Ultra- low volume or Ultra - low dosage (ULV or ULD) sprayers commonly called “ULV aerosol foggers” normal droplet range 5 to under 20 microns as set by flow meter</td>
<td>• uses high speed air to atomize or break up the liquid into an acceptable ultra-low volume droplet particle size of under 20 microns • truck mounted unit commonly uses discs to atomize a liquid using the centrifugal force of an air blower to eject droplets at a high velocity - usually has cab computerized controls</td>
<td>• typical use: see 1. above • to control a wide range of flying insects and apply commercial aerosol product chemicals or concentrates • some equipment have an attached crack and crevice device to reduce pesticide risk • flow rate must be properly adjusted when using a ULV concentrate</td>
</tr>
<tr>
<td>3. Thermal Aerosol Foggers fog particle size range 0.05-50 microns</td>
<td>• air is heated in an internal nozzle and atomization occurs by the exhaust of the resonant pulse-jet engine • produces a high output, non-residual thermal fog</td>
<td>• primary uses is for application to control to control flying insect pests on landfill sites, golf courses, resorts, campgrounds, greenhouses • fog can easily drift off-target</td>
</tr>
</tbody>
</table>
A Technician cannot calibrate equipment, however, after reading this section you should obtain a better understanding of:
- what calibration is
- major factors that affect output
- what is meant by pesticide rate
- why it is important to use the correct amount of pesticide for the job

Calibration is a test measurement of the output of your application equipment under typical operating conditions. A licensed exterminator needs to calibrate your equipment to know how much pesticide you are to apply.

Calibration should be done:
- before you use application equipment
- when you change the pesticide product or dilution
- at regular intervals to determine whether there has been wear of the equipment.

Wear can change the output of your application equipment.

It is very important to take time to have your supervising licensed exterminator calibrate your application equipment. He or she must make sure that the pesticide is being applied at the application rate recommended on the label. This is determined by measuring the output of the sprayer or applicator.

The first step is to find out what output is required for the pesticide you are using.

For granular pesticides, the applicator output is given on the label as weight per unit of area (for example - 1.5 kilograms per 100 metres squared or 1.5 kg/100 m²).

For liquid pesticides, the sprayer output is the amount of spray applied per unit of area. Some labels tell you exactly what the sprayer output should be - for example: "Apply 32 mL of pesticide in 1 L of water per 100 m²".
The sprayer output should be 100 L of water per hectare.

Some labels will not give you the exact output. For example, the label may state, "apply 45 ml of pesticide in up to 500 L of water per 100 m²", or "in 200 to 600 L of water per 100 m².

If the label does not state the exact output, your supervising licensed exterminator must select the output that is right for the treatment.

When using liquid spray equipment you must take into account the following:
- the coverage required - spraying to runoff requires a greater sprayer output than spraying only to wet the surface
- the surface to be treated - dense foliage or porous surfaces may require a greater sprayer output
- droplet size - a high sprayer output generally means a coarse spray can be used
- mixing requirements - a high sprayer output may require large spray tanks or frequent stops to mix spray solutions

General guidelines for land exterminations

Herbicides are generally applied using 300 to 600 L of water per hectare (1 hectare equals 10,000 m²).

Insecticides and fungicides are generally applied using 1,000 L of water per hectare or 10 L water per 100 m².

Aerial applications may use lower sprayer output, for example, from 25 to 200 litres per hectare or 0.25 L per 100 m².

The three factors which determine the output of pesticides from all types of application equipment are:
- size of the openings
- ground speed
- pressure

For granular applicators, the equipment operation instructions state what setting to use to get a specific output. They will also state the speed you should drive or walk to spread it evenly.
For liquid spray equipment, the output depends on the size of the nozzle opening. Nozzle manufacturers usually provide charts which show the combination of nozzle size and pressure that will give you a specific nozzle output (L/min). However, you should check the output of each nozzle in the field when you calibrate your equipment. Most charts of nozzle output are based on tests using water, not pesticide solution. Wear on the nozzle openings will affect the nozzle output.

**Ground speed**

Ground speed is the speed that you drive the equipment or walk the area. The faster you go, the lower the output will be. This is called an inverse relationship. For example, if you double the speed, you will cut the output of your application equipment in half.

Motorized equipment must be operated at a speed suited to the job. The usual speed is between 3 and 12 km/h. If the speed is too fast, the pesticide will drift. If the speed is too slow, it may take too long to apply the product.

Vehicle speedometers are not always accurate when spraying a limited area. It may be necessary to check your driving speed by timing how long it takes you to drive over a measured distance on the application area. Make a note of the gear, and throttle setting or rpm, so you will know what settings to use when you apply the pesticide.

When applying pesticide by hand, try to maintain a constant walking speed to evenly distribute the pesticide. Time yourself to see how long it takes you to treat a known area. This will help you to know the speed at which you normally spray.

**Pressure (force)**

For granular equipment, no force is needed to push the granules through the openings. Output is determined by the opening size and the speed only.

For liquid spray equipment, force is generated by a pump and is measured in kilopascals (kPa). The more force that is applied to the liquid, the higher the output will be. Reduce the force (pressure) and you reduce the output. The manufacturers of application equipment have developed tables that tell you how these factors interact to give a specific output. However, you should not depend on a manufacturer's chart to be sure of your output.
The equipment must be tested in the application area. Even a small change in any of these factors will affect the amount of pesticide that is applied.

Always test your equipment with your supervising licensed exterminator in the application area to be sure of your output for the speed, pressure, and nozzle or gauge setting you are using. This test is the calibration of your equipment.

**Applying the right amount of pesticide**

For the most effective pest control, you must:

- choose the right pesticide
- apply it at the right time
- apply the right amount of pesticide

The amount of pesticide applied per unit of area or per plant is known as the pesticide rate. The label on each product tells you the pesticide rate for specific pests on specific crops or on livestock.

**Pesticide label is a legal document**

Remember that a pesticide label is a legal document. You must follow the directions exactly. You must use the product only for the pests and uses described on the label or on the crops or livestock listed on the label. You must use the pesticide rate shown on the label.

**Determining the sprayer’s tank coverage area**

The power sprayer tank’s coverage area is most accurately and safely determined by a supervising exterminator.

The sprayed coverage area is measured and recorded in an equipment log book as the sprayer’s tank coverage area. This value is used to calculate the appropriate amount of pesticide product required. This knowledge enables the supervising exterminator to calculate the coverage area of a partially filled tank.

A common, but less accurate, practice used by supervising exterminators is a partial tank fill and thereafter measuring the sprayed square metre coverage area. **It is impossible to accurately determine product amount without knowing a spray tank’s pre-tested coverage area.**

**Your equipment is pre-calibrated**

Your application equipment will always be pre-calibrated by a licensed exterminator to determine the coverage area.
The pesticide product amount that can be added to your sprayer’s tank is directly determined by your equipment’s specific components. Calibration, conducted by a licensed exterminator is recorded in the company’s equipment application log book for future reference.

**Do not exceed label rates**

Pre-set pressure, valve openings, nozzle height, orifice size and application speed determines the amount of product that can be added to the tank and must **never exceed** product label instructions for coverage area.

If you encounter a problem with a sprayer’s pre-settings that impair your ability to safely apply a pesticide, this information should be immediately brought to the attention of your supervising exterminator.
Learning Objectives

After reading and studying this section you should know:
- what to do in an emergency involving pesticide related illness or injury as a result of oral, dermal or inhalation exposure of a pesticide
- the four (4) basic facts you need to supply to medical authorities when reporting a poisoning

Emergency action

In spite of all precautions, pesticide accidents can still happen. Learn the signs of poisoning and find out what to do in an emergency.

If an accident happens:
- stay calm and act quickly - prompt action may save a life
- protect yourself from injury - always put on protective clothing and equipment before entering a contaminated area or handling a patient
- call 911 for emergency assistance
- stop the exposure, if possible, by moving the patient away from the contaminated area and remove all contaminated clothing (use soap and water to wash skin that has been exposed to the pesticide)
- determine the route of entry for the pesticide (i.e., mouth, skin, or lungs) and if you are trained start the first aid treatment for that route of entry
- provide the PCP number of the pesticide product to medical authorities.

It is strongly recommended that you take a basic first aid course.

First aid treatment for pesticide accidents

The first aid treatments outlined in this section will help you deal with pesticide accidents. Remember that first aid information is on the label of every pesticide product. The location of the information and details will change for each pesticide, so read each label carefully. Be sure that you know the first aid treatment before using a pesticide.

The first aid treatment that you use will depend on the route
of entry of the pesticide. The victim may have breathed in the pesticide (lungs), swallowed it (stomach), or taken it in through his skin or eyes. This section tells you what first aid you may offer while you wait for medical help. Be sure to call 911 as soon as possible.

**If the pesticide contacts skin**

If the pesticide has contacted the victim’s skin:
- protect yourself first by putting on protective equipment (e.g., gloves) - don’t become another victim!
- remove contaminated clothing
- rinse skin with plenty of water
- wash skin, hair, and nails thoroughly with lots of soap and water - repeat
- dry victim and if necessary wrap in a blanket

In the case of a pesticide burn, do not touch any burned or blistered skin, do not remove clothing stuck to the burned skin, do not use ointments or lotions.

**If the pesticide contacts eyes**

If the pesticide contacts eyes
- remove any contact lenses
- hold eyelids open and wash with large amounts of clean running water and wash for fifteen minutes or more

**If the pesticide is inhaled**

If the pesticide is inhaled (e.g., dusts or gases)
- always put on protective equipment before entering a contaminated area
- move the victim to fresh air
- loosen tight clothing
- give artificial respiration if needed to keep the victim breathing

**If the pesticide is ingested**

If the pesticide is ingested/swallowed and you suspect a poisoning:
- call 911 for emergency assistance
- check the pesticide label for first aid directions and for the PCP number
- call the Poison Control Centre with the PCP number
- induce vomiting ONLY if directed to by a physician

**Do not induce vomiting**

Do not induce vomiting when patient:
- is unconscious or in a coma
- is in convulsions
- has swallowed petroleum products (products containing
oils such as Emulsifiable Concentrates)
• has swallowed a corrosive poison (strong acid/alkaline products)

Four basic facts
Four basic facts are needed to give fast and effective treatment to a poison victim. The doctor, ambulance, or Poison Control Centre will ask you for this information when you call. Collecting this information will not take long, and it is important.

The four basic facts are:
• identify the product:
• determine the quantity
• determine route of entry
• determine time since exposure occurred

Identify the product
The P.C.P. Act Registration Number on the label identifies the product. Look for the container, the label, or left-over pesticide. The manufacturer or registrant of the product may also give emergency information. Some companies list a 24 hour emergency number on the label.

Determine the quantity
Estimate how much product the person has been exposed to and/or ingested. This will help determine the seriousness of the accident.

Determine route of entry
The route of entry can be through the mouth, skin, or lungs. The first aid you do will depend on how the pesticide entered the body.

Determine time since exposure occurred
How long was the patient exposed to the pesticide? Is the poisoning a result of continued use over a number of years or were the symptoms immediate? If you can’t find out all four facts, do not waste time. Provide whatever information is available to the doctor, ambulance, and/or the Poison Information Centre. Follow the advice of the medical personnel. Poison Control Centre number is listed in the front page of the telephone book. There is only one Poison Control Centre in Ontario. It provides information on all types of poisonings, including pesticide poisonings: Advice is available 24 hours a day, 7 days a week.

Poison Control Centre numbers
Ontario Poison Centre (located at Hospital for Sick Children - Toronto) Local 416-813-5900
Toll Free 1-800-268-9017 supports all of Ontario
In spite of all precautions, accidents can happen whenever pesticides are in use. It is important to act quickly when a spill occurs. Learn how to deal with pesticide spills.

Prevent a spill
Check hoses, pumps and equipment before you use them to ensure that they are not damaged.

Be prepared
Have protective equipment available and accessible if a spill does occur whether it is in the storage room or in or near your vehicle. Carry a spill kit with you that include emergency numbers and contacts, a shovel, absorbent material, rubber gloves and boots, respirator and eye protection and plastic containers to put contaminated material into.

Stop the spill
If a spill does happen, make sure you wear protective equipment before you do anything. Then quickly stop the pump or whatever is required to stop the discharge of pesticide.

Contain the spill
Attempt to contain the pesticide. Do not allow the pesticide to enter drains or watercourses. Keep people away from the spill. Use absorbent sand or vermiculite socks, sawdust or kitty litter to stop the flow. Dig a ditch or build a dyke out of gravel or sand to prevent movement. If the spill involves a wettable powder or dust, cover the pesticide with a plastic tarp and secure it to prevent wind dispersal.

Call for help
The Pesticides Act and the Environmental Protection Act requires every person who discharges a pesticide or a substance or thing containing a pesticide in or into the environment out of the normal course of events and may cause or likely to cause a harmful effect must be reported to the Ministry of the Environment, the Spills Action Center. Notify the local municipality.
As soon as it is possible and safe to do so, notify your supervising licensed exterminator that a spill has occurred.

The SPILLS ACTION CENTRE of the Ministry of the Environment will receive your calls 24 hours a day at 1-800-268-6060.

NOTES
Learning Objectives

After reading and studying this section you should know:

- what it means to “be a professional”
- the importance of your responsibility to act professionally to ensure good relations with the public
- the advantages of being a professional
- the check list for professionalism
- how to deal with requests for pre-notification

As a technician, you will help in the protection of property from destructive pest organisms. However, in your position, you will be directly responsible for the safety of both the public and the environment. Most of the materials you will be applying are potentially harmful to human health and environment if misused. Being a pesticide applicator is not a job for a person who is unwilling to accept responsibility.

Professionalism

Professionalism refers to the care and attention shown by the technician in exercising the responsibilities of the job, and interacting appropriately with the public. It is important to be able to assure the public that pesticides are being handled responsibly.

Maintaining a good public image

To develop and maintain professionalism, you must know your business (i.e., the safe and effective use of pesticides as described on the product labels, and as regulated by law) by:

- having a professional attitude
- projecting a professional image
- conducting your activities safely and professionally
- communicating courteously with the public and your customers
- being knowledgeable about what you are applying and why

Advantages of professionalism

Professionalism will make your job easier every step of the way by:

- building client confidence
- enhancing your credibility
- improving public trust
Check list for professionalism

A check list of acts that shows your public professionalism.

- Carefully read and follow your invoice or job work order instructions and customer notes.
- Always inspect the site before commencing an application. Pick up any toys and remove all articles (e.g., pet dishes) to a safe area that is shielded from the pesticide application area in order to reduce the risk of contamination.
- Never spray an area where children, pets or animals are present.
- Make certain the application will not contaminate any barbecues, sand boxes or wading pools.
- Check and make certain all windows and doors are closed if performing an exterior structural extermination.
- Check that you have firmly re-closed the backyard gate when finished. This is extremely important with pools.
- Never apply pesticides when food or feed is exposed.
- Be aware of natural and man made bodies of water for example pools, ponds. Establish a buffer area around these areas to prevent contamination.
- Refer any questions to your supervising licensed exterminator.
- Be open to the public’s concerns and address them by referring them to your supervising licensed exterminator.

Actions to be taken when neighbours request pre-notification

Make certain you follow your invoice or work order instructions and notify any neighbours before an application when indicated on the invoice or work order.

Some people are very sensitive to pesticides and/or the solvents used in the product and may have requested prior notification of a pesticide application at a client’s site.

When approached by a neighbour requesting advance notification you should record the person’s name, address and phone number for all future pesticide applications. This information should be given to your supervising licensed exterminator.
## Appendix A

Ontario Ministry of the Environment - Regional Pesticides Specialists

<table>
<thead>
<tr>
<th>REGION</th>
<th>County/Township</th>
<th>PESTICIDE SPECIALISTS Address</th>
<th>Telephone/Toll Free/Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Central Region</strong></td>
<td>Toronto, Halton, Peel York and Durham, Muskoka, Simcoe</td>
<td>5775 Yonge St, 8th Floor Toronto, Ontario M2M 4J1</td>
<td>(416) 326-3671 OR (416) 326-3477</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Toll Free 1-800-810-8048 Fax (416) 325-6347</td>
</tr>
<tr>
<td><strong>West-Central Region</strong></td>
<td>Haldimand, Norfolk, Niagara, Hamilton-Wentworth, Dufferin, Wellington, Waterloo, Brant</td>
<td>119 King St. West, 12th Floor Hamilton, Ontario L8P 4Y7</td>
<td>(905) 521-7551 OR Toll Free 1-800-668-4557</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fax (905) 521-7820</td>
</tr>
<tr>
<td><strong>Eastern Region</strong></td>
<td>Frontenac, Hastings, Lennox &amp; Addington, Prince Edward, Leeds &amp; Grenville, Prescott &amp; Russell, Stormont/Dundas &amp; Glengarry, Peterborough, Kawartha Lakes, Northumberland, Renfrew, Ottawa, Lanark, District of Nipissing (Twp. of South Algonquin), Haliburton</td>
<td>1259 Gardiners Road Box 22032 Kingston, Ontario K7M 8S5</td>
<td>(613) 540-6874 OR Toll Free 1-800-267-0974</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fax (613)548-6908</td>
</tr>
<tr>
<td><strong>Southwestern Region</strong></td>
<td>Elgin, Middlesex, Oxford, Essex, Kent, Lambton, Bruce, Grey, Huron, Perth</td>
<td>733 Exeter Rd., London, Ontario N6E 1L3</td>
<td>(519) 873-5115 OR (519) 873-5047</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Toll Free 1-800-265-7672 Fax (519) 873-5020</td>
</tr>
<tr>
<td><strong>Northern Region (east)</strong></td>
<td>Manitoulin, Nipissing, Parry Sound, Sudbury, Algoma (East), Timiskaming, Sault Ste. Marie</td>
<td>199 Larch Street, Ste 1101 Sudbury, Ontario P3E 5P9</td>
<td>(705) 564-3249</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Toll Free 1-800-890-8516 Fax (705) 564-4180</td>
</tr>
<tr>
<td><strong>Northern Region (west)</strong></td>
<td>Algoma (West), Cochrane, Kenora, Rainy River, Timmins, Thunder Bay</td>
<td>435 James St. S., Suite 331 Thunder Bay, Ontario P7E 6S7</td>
<td>(807) 475-1712</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Toll Free 1-800-875-7772 Fax (807) 475-1754</td>
</tr>
</tbody>
</table>
Practical Pesticide Safety Training Document

This document verifies the completion of the practical component of the basic pesticide safety course as a requirement to become a Technician. In addition, this document may be used to record specific training of a Technician as required in Regulation 63/09 under the *Pesticides Act*. (Note: Parts IA, II and IV of this form can also be used as a record of training for a Trainee as required in Regulation 63/09 under the *Pesticides Act*.

**PART I:** The person named in **PART I A** below has, in the opinion of the licensed exterminator named in **PART I B**, successfully demonstrated the following **MANDATORY** basic practical pesticide safety tasks.

<table>
<thead>
<tr>
<th>MANDATORY Basic Practical Pesticide Safety Tasks Demonstrated by the Candidate in the presence of a Licensed Exterminator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Diluting (mixing) a concentrated pesticide:</strong> The candidate must demonstrate that he or she can properly put on the appropriate protective clothing in accordance to the label before beginning the mixing procedure. The candidate must demonstrate the procedures for proper handling, and mixing of a pesticide concentrate by following the information on a pesticide product label and the direction of the Supervising Licensed Exterminator.</td>
</tr>
<tr>
<td>2. <strong>Correctly applying a pesticide:</strong> The candidate must demonstrate the application of a pesticide in order to control a specific pest and follow the application rate and precautions according to label directions and the direction of the Supervising Licensed Exterminator.</td>
</tr>
<tr>
<td>3. <strong>Emergency response procedures for equipment:</strong> The candidate must demonstrate the procedure for properly and safely shutting-off power spray equipment or releasing pressure on equipment in the event of a hose rupture or leak.</td>
</tr>
<tr>
<td>4. <strong>Emergency response procedures for pesticide exposure:</strong> The candidate must verbally provide the steps involved when a pesticide has been spilled on to his or her clothing and body.</td>
</tr>
<tr>
<td>5. <strong>Emergency response procedures for handling a spill:</strong> The candidate must demonstrate containment, clean-up, decontamination and disposal procedure of a minor pesticide spill and the procedure for contacting the supervising-licensed exterminator in the event of a major spill. Water can be used in this simulated demonstration.</td>
</tr>
</tbody>
</table>

(Print) *(leave blank if a Trainee)*

A: Name: ............................................................ Technician Identification Card No.#.................................

Address: .................................................................................................................................................... City: ..................................................

Postal Code: ........................................ Birth Date: ........................................ Res. Tel: ........................................

This form requests certain personal information from you which is collected and used by the Pesticide Industry Council (PIC) and the Pesticide Industry Regulatory Council (PIRC), and by the employer and licensed exterminator verifying basic practical pesticide safety training, for the purposes of training, and for assessing and verifying candidate eligibility for Technician Identification Cards. This information, including exam results where applicable, may be disclosed to the PIC/PIRC/Ministry of the Environment for purposes related to the Pesticide Technician Program and the administration and enforcement of *The Pesticides Act* and the regulations thereunder. By completing this form and providing your signature to it, you are consenting to the collection, use and disclosure of your personal information for purposes consistent with those outlined above.

Signature: ..........................................................................................................................
Part 1 (cont’d):

B: Name of Licensed Exterminator Verifying Basic Practical Pesticide Safety Training:

(Print) ............................................................................................................. Licence No: .............................................

Address: ..........................................................................................................................

City: .................................................. Postal Code: .............................................

This form requests certain personal information from you which is collected and used by the Pesticide Industry Council (PIC) and the Pesticide Industry Regulatory Council (PIRC), and by the employer and licensed exterminator verifying basic practical pesticide safety training, for the purposes of training, and for assessing and verifying candidate eligibility for Technician Identification Cards. This information, including exam results where applicable, may be disclosed to the PIC/PIRC/Ministry of the Environment for purposes related to the Pesticide Technician Program and the administration and enforcement of The Pesticides Act and the regulations thereunder. By completing this form and providing your signature to it, you are consenting to the collection, use and disclosure of your personal information for purposes consistent with those outlined above.

Signature: .......................................................... Date: .............................................

C: Employer Name:

(Print) ..........................................................................................................................

Operator Licence Number: (if applicable): .................................................................

Business Mailing Address: .....................................................................................

City: .................................................. Postal Code: .............................................

Telephone Number: ........................................ Fax Number: ...........................................

PART II: The person named in PART IA has received specific training, to meet the requirements in Regulation 63/09 under the Pesticides Act in the following:

☑ PESTICIDES LISTED AS AUTHORIZED TO BE USED: (trade name & P.C.P. number)

☐ Herbicides: .............................................................................................................
□ Insecticides:  ........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
□ Rodenticides: ...................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
□ Other: ..............................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

☑ EQUIPMENT LISTED AS AUTHORIZED TO BE USED:
☐ Hand Operated Spraying and Dusting Equipment ☐ Spray Truck ☐ ULV Fogger ☐ Power Duster
☐ Other: ..............................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

☑ PESTS OR PROCEDURES LISTED AS AUTHORIZED TO CONTROL:
LAND: ☐ Weeds ☐ Turf Insects ☐ Grubs ☐ Lawn Moths ☐ Chinch Bugs ☐ Mosquito Control
☐ Other - list .......................................................................................................................................
........................................................................................................................................
☐ Soil Sterilization
☐ Tree/Shrub Spraying
☐ Other ..............................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

STRUCTURAL: ☐ Insects (Specify) ☐ Ants ☐ Earwigs ☐ Fleas ☐ Flies ☐ Roaches ☐ Silverfish
☐ Stored Product Pests ☐ Wasps/Bees ☐ Spiders ☐ Other - list ................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
PART III: If a Technician

The undersigned attest that the requirements in Regulation 63/09 under the Pesticides Act are hereby recorded and deemed to be met.

Date Signature of Technician Signature of Supervising Licensed Exterminator

MOE Licence Number

PART IV: If a Trainee

The undersigned attest that the trainee training requirements in Regulation 63/09 under the Pesticides Act are hereby recorded and deemed to be met.

Date Signature of Trainee Signature of Supervising Licensed Exterminator

MOE Licence Number
Regulation 63/09 under the *Pesticides Act*

**Technician Identification Card**

The PIC and the PIRC will provide Examiners with Technician Identification Cards (TIC) in a standardized format that contains the information below. Examiners will provide the TIC to a candidate who successfully completes the Academic Examination or to a candidate who satisfactorily completes both the Academic Examination and Practical Demonstration (if the examiner is also the licensed exterminator overseeing the practical demonstration). Each council may place their name first on all Pesticide Technician Program (PTP) printed documents.

**FRONT OF PIC CARD**

<table>
<thead>
<tr>
<th>PART C – Name of Employer or Institutional Training Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>[PREPRINTED NAME OF EMPLOYER OR INSTITUTIONAL RESOURCE, ADDRESS, POSTAL CODE, and BUS. TELEPHONE NUMBER]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PART D – Practical Demonstration</th>
</tr>
</thead>
<tbody>
<tr>
<td>I attest that the holder of this card has demonstrated to my satisfaction the practical pesticide safety training component of the Pesticide Technician Program.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signature Of Licensed Exterminator</th>
<th>Date Satisfactorily Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print Name Of Licensed Exterminator (if different from Examiner in Part B)</td>
<td>Exterminator’s Licence Number</td>
</tr>
<tr>
<td>Technician Identification Card No.</td>
<td>PIC – 06002-10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PART A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candidate.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PART B - Academic Examiner [Preprinted First and Last Name + EX- ID Number]</th>
</tr>
</thead>
<tbody>
<tr>
<td>The academic examination based on the Technician Manual has been successfully completed and the results will be forwarded to the PIC as recorded in Part F.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signature of Examiner</th>
<th>Date of Successful Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technician Identification Card No.</td>
<td>PIC – 06002-10</td>
</tr>
</tbody>
</table>

**BACK OF PIC CARD**

<table>
<thead>
<tr>
<th>Misuse of this card is an offense. Violators will be prosecuted.</th>
</tr>
</thead>
</table>

This Technician Identification Card is not valid until the holder of this Card has successfully completed the academic examination and has satisfactorily completed the practical demonstration. The signatures of the Examiner and Licensed Exterminator verifies that the Candidate named in Part A has completed a basic pesticide safety course and is now considered to be a “Technician” as defined in Regulation 63 – 09 of the Pesticides Act.

<table>
<thead>
<tr>
<th>PART E – Technician (Card is the property of the Technician)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I acknowledge my responsibility under O. Regulation 63 / 09 of the Pesticides Act.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>This card must only be used by the below named technician:</th>
</tr>
</thead>
</table>

| Signature of Technician | * Expiry date is two years from the date in Part B |

**PART F - Changes In Address and or Telephone Number. No Fee Applicable.**

You must contact the council that issued your Technician Identification Card within 7 days to record any changes in your mailing address or telephone number.

<table>
<thead>
<tr>
<th>Pesticide Industry Council (PIC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toll Free 1-800-265-5656 or PIRC 1-800-615-9813</td>
</tr>
<tr>
<td>Civic Landscape Ontario</td>
</tr>
<tr>
<td>7856 Fifth Line S.</td>
</tr>
<tr>
<td>Milton, ON L9T 2X8</td>
</tr>
<tr>
<td>Fax: 1-519-455-5915</td>
</tr>
<tr>
<td>Email: <a href="mailto:pic@landscapeontario.com">pic@landscapeontario.com</a></td>
</tr>
</tbody>
</table>

| Website: wwwptppic.org |

**PART G - Process to Replace a Lost or Damaged Technician Identification Card**

To replace a lost or damaged Technician Identification Card you must contact the issuing Council named in Part F.

<table>
<thead>
<tr>
<th>Pesticide Industry Council (PIC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toll Free 1-800-265-5656</td>
</tr>
</tbody>
</table>

| Civic Landscape Ontario |
| 7856 Fifth Line S. |
| Milton, ON L9T 2X8 |
| Email: pic@landscapeontario.com |

| Website: wwwptppic.org |

**PART H - Replacement of a Lost or Damaged Card**

This is a replacement card issued by the PIC named in Part F.

| Signature of PIC Official | Expiry Date of Technician Identification Card |

Cards issued by the PIC will be odd numbered preceded by the letters PIC and cards issued by PIRC will be even numbered preceded by the letters PIRC. The year of issue to an Examiner is the last two numbers of the TIC. An Examiner appointed by PIC or PIRC directs the examination results and registration to the Council named in Part F of the TIC.
A Technician Identification Card (TIC) is null and void if:

a) the named candidate in Part A fails to satisfactorily complete the practical demonstration within 30 days (before or after) of the successful Academic completion date in Part B when employed in the pest management industry.

b) the named candidate in Part A **fails** to satisfactorily complete the practical demonstration within **365 days** after the Academic completion date in Part B **when not employed** in the pest management industry.

A TIC is valid for **two years** from the date of the successful Academic Examination Date written in Part B. Once signed the TIC becomes the property of the Technician.
### Table 4.1 Classification of Pesticide Products in Ontario, Criteria and Users for Each Class

<table>
<thead>
<tr>
<th>Ontario Class</th>
<th>Federal class</th>
<th>Criteria</th>
<th>Who may sell or transfer</th>
<th>Who may use</th>
</tr>
</thead>
</table>
| 1             | Manufacturing     | Manufacturing concentrates used in the manufacture of a pesticide product | General vendor                 | • Manufacturer
                |                   |                                                                          |                                | • Researcher
                |                   |                                                                          |                                | • Person with written approval from the Director |
| 2             | Commercial or Restricted | Must meet at least one criteria listed below:                            | General vendor                 | • General vendor
                |                   | Fumigant gas                                                          |                                | • Manufacturer
                |                   | Acute oral $LD_{50} \leq 50$                                           |                                | • Licensed exterminator
                |                   | Acute dermal $LD_{50} \leq 100$                                        |                                | • Qualified farmer* |
                |                   | Soil $T_{1/2} \geq 6$ months                                           |                                | • Permit holder
                |                   |                                                                          |                                | • Bee Inspector* |
                |                   |                                                                          |                                | • Supervised farmer* |
                |                   |                                                                          |                                | • Person with written approval from Director |
| 3             | Commercial or Restricted | Must meet at least one criteria listed below:                            | General vendor                 | • General vendor
                |                   | Acute oral $LD_{50} > 50 - 500$                                         |                                | • Manufacturer
                |                   | Acute dermal $LD_{50} > 100 - 1000$                                     |                                | • Licensed exterminator* |
                |                   | Soil $T_{1/2} > 1$ month - < 6 months                                   |                                | • Qualified farmer* |
                |                   |                                                                          |                                | • Permit holder |
                |                   |                                                                          |                                | • Bee Inspector |
                |                   |                                                                          |                                | • Registered Bee Keeper |
                |                   |                                                                          |                                | • Supervised farmer* |
                |                   |                                                                          |                                | • Person with written approval of Director |
                |                   |                                                                          |                                | • Technician/trainee* |
| 4             | Commercial or Restricted | Must meet all criteria listed below:                                     | General vendor                 | • General vendor
                |                   | Acute oral $LD_{50} > 500$                                              |                                | • Manufacturer |
                |                   | Acute dermal $LD_{50} > 1000$                                            |                                | • Licensed exterminator |
                |                   | Soil $T_{1/2} \leq 1$ months                                             |                                | • Qualified farmer |
                |                   |                                                                          |                                | • Farmer |
                |                   |                                                                          |                                | • Permit holder |
                |                   |                                                                          |                                | • Bee Inspector |
                |                   |                                                                          |                                | • Registered Bee Keeper |
                |                   |                                                                          |                                | • Supervised farmer |
                |                   |                                                                          |                                | • Person with written approval of Director |
                |                   |                                                                          |                                | • Technician/trainee* |
| 5             | Domestic          | Must meet at least one criteria listed below:                            | General vendor                 | • General vendor
<pre><code>            |                   | Acute oral $LD_{50} \leq 5000$                                          | Limited vendor                 | • Manufacturer |
            |                   | Acute dermal $LD_{50} \leq 10,000$                                      |                                | • Licensed exterminator |
            |                   | Soil $T_{1/2} \geq 2$ weeks                                             |                                | • Qualified farmer |
            |                   | Container size is $&gt; 1$ kg or $&gt; 1$ L                                   |                                | • Permit holder |
            |                   |                                                                          |                                | • Bee Inspector |
            |                   |                                                                          |                                | • Registered Bee Keeper |
            |                   |                                                                          |                                | • Supervised farmer |
            |                   |                                                                          |                                | • Person with written approval of Director |
            |                   |                                                                          |                                | • Technician/trainee* |
            |                   |                                                                          |                                | • Limited vendor |
</code></pre>
<p>|               |                   |                                                                          |                                | Any person |</p>
<table>
<thead>
<tr>
<th></th>
<th>Domestic or Restricted</th>
<th>Pesticides with:</th>
<th></th>
<th>General vendor</th>
<th>Limited vendor</th>
<th>Any person but only for non-cosmetic purposes (consumer notification at purchase).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Domestic</td>
<td>Must meet all criteria listed below:</td>
<td></td>
<td>Any person</td>
<td>Any person</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute oral LD50 &gt; 5,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute dermal LD50 &gt; 10,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil T1/2 &lt; 2 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Container size is ( \leq 1 \text{ kg or } \leq 1 \text{ L} )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Domestic or Restricted</td>
<td>Pesticides with:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• cosmetic and non-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>cosmetic uses on label;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ready-to-use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>formulations listed in</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Class 10; or</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• restricted use containing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>capsaicin.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controlled sales pesticides with both cosmetic and non-cosmetic uses on the label</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Domestic</td>
<td>List of pesticides banned for sale (label uses are cosmetic and contain an ingredient listed in Class 9).</td>
<td></td>
<td>No sale permitted</td>
<td>No use permitted</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>List of active ingredients in Class 2 - 8 that are prohibited for use (unless exempted by the Regulation).</td>
<td></td>
<td>Banned for use in, on or over land unless their use is excepted</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>List of active ingredients exempt under the Regulation to be used to destroy plants that are poisonous to humans by touch.</td>
<td></td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>List of active ingredients that are considered biopesticides or lower risk pesticides that may be used for cosmetic purposes. A green “NOTICE” sign is required for public notification under the Regulation.</td>
<td></td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

* With Conditions/Restrictions on use

For more information on how pesticides are classified refer to the document “Pesticide Classification Guideline for Ontario” found on the MOE’s web site:

APPENDIX E

Sign Legislation

All signs referred to in this appendix must comply with the illustrations on the Ministry’s website http://www.ene.gov.on.ca/en/land/pesticides/signs.pdf.

For more information on sign legislation please review Ontario Regulation 63/09 (sections 74 to 81) or contact your Regional Pesticide Specialist (Appendix A).

A technician must accurately record information onto the sign regarding the specific extermination being performed (e.g. the name of the pesticide and PCP#) and must post a sign when performing a land extermination. Signs must be made of rain resistant material and must be sturdy enough that they can be read at all times and be reused.

Post a green notice sign if pesticides containing only class 11 ingredients are used. Post a red warning sign if any other pesticide is used. Use the residential size (smaller) signs for residential areas, or the non-residential (larger) sized signs for non-residential areas. The following table can assist in determining what sign to post:

<table>
<thead>
<tr>
<th>只有一种成分11使用</th>
<th>标识C（住宅区的地面灭虫）</th>
<th>标识E（非住宅区的地面灭虫）</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Notice</td>
<td>Sign C (Notice — Residential area land extermination)</td>
<td>Sign E (Notice — Non-residential area land extermination)</td>
</tr>
<tr>
<td>Any other pesticides (Red Warning)</td>
<td>Sign D (Warning — Residential area land extermination)</td>
<td>Sign F (Warning — Non-residential area land extermination)</td>
</tr>
</tbody>
</table>

Signs must be conspicuously posted at least every 100 meters along the perimeter of the application area or property when the perimeter of the treatment area is within 100 meters of a dwelling unit or is adjacent to an area where the public has ready access.

Signs may not be posted on trees, fences or buildings, or on any signboards that have other signs posted.

A sign is posted along the perimeter if it is posted within 10 meters of the perimeter. Signs are not required to be posted along a portion of the property where the public is sufficiently excluded by a barrier (such as fencing).

Residential area signs must be posted immediately before the extermination begins. If only one residential area sign is required, it must be posted at an ordinary point of access to the treatment area.
Non-residential area signs must be posted at all ordinary points of access to the treatment area. If there are no ordinary points of access to the application area and there is a larger area that includes the application area and for which the same person is responsible, signs must be posted at all ordinary points of access, to that larger area.

Non-residential area signs must be posted immediately before the extermination begins except at:

- an educational institution or facility, including a daycare facility, nursery school, primary school, high school, private school or post-secondary institution;
- a residential building that is not a detached house, semi-detached house or rowhouse, including an apartment building, condominium or long-term care home;
- a park;
- a cemetery;
- a golf course, or;
- a campground

In the above situations signs must be posted at least 24 hours but not more than seven days before the extermination begins. The following can assist in determining what sign to post and when to post:

<table>
<thead>
<tr>
<th>Characteristic of the Application Area</th>
<th>Sign (Residential Area or Non-Residential Area)</th>
<th>When to Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apartment, Condominium, Long-term care home, school or daycare center on a parcel or lot</td>
<td>Non-residential area sign</td>
<td>at least 24 hours but not more than seven days before the extermination begins</td>
</tr>
<tr>
<td>Five or more detached houses, rowhouses or semi-detached houses on a parcel or lot</td>
<td>Non-residential area sign</td>
<td>Immediately before the extermination begins</td>
</tr>
<tr>
<td>Place of worship, industrial or commercial building on a parcel or lot</td>
<td>Non-residential area sign</td>
<td>Immediately before the extermination begins</td>
</tr>
<tr>
<td>1-4 detached, semi-detached or row houses on a parcel or lot</td>
<td>Residential area sign</td>
<td>Immediately before the extermination begins</td>
</tr>
</tbody>
</table>

When an extermination is performed on any cemetery or on a park or golf course in a rural area or on a golf course to which access by unauthorized persons is controlled by means of gates, fences or other barriers, and one of the following conditions is met,
1. Signs are posted at all ordinary points of access at least 24 hours but not more than seven days before the extermination begins, or
2. Signs are posted at all locations where visitors normally come into contact with the owner or operator of the application area or that person’s employees at least 24 hours but not more than seven days before the extermination begins, or
3. Written notices authorized by the Director for providing alternate notification are distributed during the period 24 hours before the extermination begins at all locations where visitors normally come into contact with the owner or operator of the application area or that person’s employees, or
4. Public notice is given by means that are approved in writing by the Director as providing adequate notice to all persons who may be affected by the extermination.

Any signs that are still required to be posted may be posted immediately before the application begins (instead of posting those signs 7 days to 24 hours before the extermination begins).

If one of the four above mentioned conditions have been met and the application area is at a campground, any signs that are still required to be posted may be posted immediately before the application begins IF 24 hours before the extermination begins either signs are posted, written notices approved by the director for alternative notification are distributed, public announcements are made, or other similar means are implemented, to give notice to people who have previously entered the campground.

Signs must not be removed until after 48 hours following the completion of the extermination. The person who performed the extermination must ensure that signs are removed no later then 10 days after the completion of the extermination, and must provide written notice of this requirement to the owner or occupier of the application area, or the person responsible for the application area.
Pesticide Technician Program (PTP)

This Technician Training manual is the property of:

Technician Name: .................................................................

Technician Assigned Number: PIC - ........................................

Date Academic Examination Passed: ........................................

Name of Academic Examiner: ..................................................

   Examiner Number: PIC-E - ..................................................

Date Passed Practical Examination: .........................................

Name of Practical Examiner: ..................................................

   Exterminator Licence number: .............................................

Date Technician Status Expires: ............................................

   (2 years from the "Date Academic Examination Passed")

Ontario

with support from the Government of Ontario

Last Revised March 15 2010
### APPENDIX F

**METRIC CONVERSION TABLE**

**Linear Measures (length)**

- 10 millimetres (mm) = 1 centimetre (cm)
- 100 centimetres (cm) = 1 metre (m)
- 1000 metres (m) = 1 kilometre (km)

**Square Measures (area)**

- 100 m x 100 m= 10,000 m² = 1 hectare (ha)
- 100 ha = 1 square kilometre (km²)

**Cubic Measures (volume)**

*Dry Measure*

- 1000 cubic millimetres (mm³) = 1 cubic centimetre (cm³)
- 1,000,000 cm³ = 1 cubic metre (m³)

*Liquid Measure*

- 1000 millilitres (mL) = 1 litre (L)
- 100 L = 1 hectolitre (hL)

**Weight Volume Equivalents (for water)**

- (1.00 kg) 1000 grams = 1 litre (1.00 L)
- (0.50 kg) 500 g = 500 mL (0.50 L)
- (0.10 kg) 100 g = 100 mL (0.10 L)
- (0.01 kg) 10 g = 10 mL (0.01 L)
- (0.001 kg) 1 g = 1 mL (0.001 L)

**Weight Measures**

- 1000 milligrams (mg) = 1 gram (g)
- 1000 g = 1 kilogram (kg)
- 1000 kg = 1 tonne (t)
- 1 mg/kg = 1 part per million (ppm)

*Dry - Liquid Equivalents*

- 1 cm³ = 1 mL
- 1 m³ = 1000 L