Integrated Pest Management Regulation - Summary of Requirements and Explanatory Notes

for

Landscape Pest Managers

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Ministry of Environment
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1. INTRODUCTION

This document has been prepared by the Ministry of Environment to assist pest managers to understand requirements under the B.C. *Integrated Pest Management Act* (IPMA) and Regulation (IPMR) when considering pesticide use for managing landscape pests.

The main objectives of the legislation is to prevent harm to human health and the environment and to promote the use of Integrated Pest Management as a means to reduce risk.

This document includes a summary list of all the IPMA and IPMR requirements for landscape pest managers, followed by 'Explanatory Notes' for selected requirements. The selected requirements were identified by industry contacts and Ministry staff as requiring guidance to help proponents understand or achieve the requirements. In many cases the selected requirements are new as of the enactment of the Integrated *Pest Management Act* in January, 2005, replacing the former *Pesticide Control Act*.

The main requirements selected for Explanatory Notes include:

- Use of Integrated Pest Management,
- Posting treatment notice signs,
- Pesticide transport and storage,
- Preparations (equipment maintenance, site inspections, briefing applicators), and
- Requirements for human health and environmental protection during pesticide use.

The main objectives of this document are to:

1. Provide a summary of requirements for the landscape industry sector for quick reference,
2. Promote the same understanding of the requirements across the landscape industry, interested public and ministry staff,
3. Provide background information and examples that may assist landscape pest managers determine the most appropriate way to meet requirements, and
4. Promote compliance with the requirements.

This is not a legal document and the contents should not be relied upon for legal purposes. In all cases the *Integrated Pest Management Act* and Regulation will prevail. This document includes information on other key regulations, guidelines and best management practices applicable to pesticide use in B.C., but should not be relied upon as a complete source of all such information.

2. SUMMARY OF REQUIREMENTS FOR LANDSCAPE PEST MANAGEMENT

Note: The requirements listed below that have an explanatory note, are identified with an icon 🕮 and the page number where the explanatory note is located.

2.1 Requirements for Obtaining a Pesticide User Licence

A pesticide user licence is required if a person (including an individual, business or corporation) provides a service involving the use of a pesticide, under a contract for services (IPMA s.[1] 4 (1)(c))[2]. This requirement for a licence includes services for the management of landscape pests on either public or private land.

A pesticide user licence is also required for a use that is not a service, but is a use **on public land** for the management of:

- pests of gardens and landscaping, including the management of weeds in sidewalks and on parking lots (IPMR s. 5(1)(i)).

This requirement for a licence includes pesticide use by regional districts, municipalities, crown corporations, hospitals, schools and universities for landscape pest management on public land.

Effective January 7, 2007, a licence is also required for the use of a pesticide that is not a service but is **on private land** and is used for:

- the management of pests in outdoor areas of a multi-residence property containing at least four separate units, to which more than one occupier has access (IPMR s. 5(1)(f)).

This requirement for a licence includes pesticide use by the owners or managers of multi-residence buildings for structural or landscape pest management on private land.

All licence holders (licensees) are required to ensure compliance with standards for the use of integrated pest management and the protection of human health and the environment, as specified in the *Act* and Regulation.

The Administrator may suspend or revoke a licence for failure to comply with the *Act* or Regulation (IPMR s. 15(1)). A licence is not transferable without the written authorization of the Administrator (IPMR s. 47 (1) (b)). A licensee must provide the Administrator with written notice of a change in any information provided by the licensee in an application (e.g., classes and amounts of pesticides used, types of use, change in business location or contact information) within 30 days of the change (IPMR s. 47 (1) (c)).

[1] s. is used as the abbreviation for Section number in this document
[2] Gives the section number of the *Integrated Pest Management Act* (IPMA) or Regulation (IPMR) which contains the requirement.

If a licensee believes that the *Act* or Regulation has been contravened (by the licensee themselves, or another person) in a manner involving the release of pesticide into the environment, the licensee must give written notice to the Administrator as soon as possible after forming the belief (IPMR s. 47 (1) (e)).

2.2 Requirements for Individuals to Obtain Training and Hold a Pesticide Applicator Certificate

Each pesticide use (that requires a licence) must be performed by, or supervised by, a person who holds a **pesticide applicator certificate** (certificate holder) endorsed for the appropriate category of pesticide use (IPMA s. 5(1), 5 (2)). A certificate holder must not supervise more than four uncertified individuals and must be no more than 500 m from, and in continuous contact which is either (a) visual or (b) auditory, with each person being supervised (IPMR s. 46 (1) (b) (ii), 46 (2)). Only a certificed applicator can use a Permit-Restricted or Restricted class pesticide. The certificate of each individual using or supervising the use of a pesticide must be at or near the treatment location during the pesticide use (IPMR s. 49 (1) (c)).

2.3 Requirements for Use of Integrated Pest Management (see Explanatory Notes pages 13 to 27)

A licensee may use a pesticide only after undertaking all of the following actions in accordance with integrated pest management principles:

- Identify and implement, or identify and advise the owner or manager of the treatment area, of reasonable measures to prevent pests;
- Identify pest species and pest complexes to be managed;
- Monitor to determine the population of pests and their location;
- Determine the injury threshold for each pest and apply them to the determination of when to use a pesticide;
- Select pest treatment methods based on:
  - consideration of practical alternatives to pesticide use, and
  - protection of human health and the environment; and
- Evaluate, following each pesticide use, the effectiveness of that use.

2.4 Public Notification Requirements

Notification is required by means of a "**Treatment Notice**" when pesticides are used on the property of a school or child care facility, the common areas of "multi-residence" properties[3] and other outdoor public use areas[4] (IPMR s. 10).

[3] A "multi-residence property" is a parcel of land on which is located two or more separate units occupied as living accommodation, whether the units are in the same building or detached. An outdoor common area of a multi-residence property is an area that is within 5 m of an entrance or window to living accommodations or maintained for purposes of passage, parking or recreation.

[4] An outdoor public use area is an outdoor, landscaped area of **public land** that is maintained for the purposes of public passage or recreation (e.g., playing fields in a municipal park).

Notification Requirements for Pesticide Use on the Property of a School or Child Care Facility

At least 72 hours before using a pesticide on the property of a **school or child care facility**, a licensee must provide a Treatment Notice to the school or facility administrator, principal or manager (or their agent) (IPMR s. 10 (7)).[5]

Notification Requirements for Pesticide Use in Outdoor Common Areas of Multi-residence Properties

At least 48 hours before using a pesticide in an outdoor **multi-residence common area,** a licensee must provide a Treatment Notice to the owner or manager of the building (or the agent of either) and either:

- Provide a Treatment Notice to each person who has access to the common area within 48 hours after the pesticide use (IPMR s. 10 (4) (b) (i)); or
- Post a Treatment Notice at each gate or opening to fenced outdoor common areas, and at intervals around outdoor common areas that are not fenced (IPMR s. 10 (4) (b) (ii) (B)).[6] [7]

Notification Requirements for Pesticide Use in Outdoor Public Use Areas

Before using a pesticide in an **outdoor public use area,** a licensee must post a Treatment Notice:

- At each gate or opening that provides access to treatment areas that are fenced (IPMR s. 10 (6) (a)); or

- At intervals around or along the treatment area if it is not fenced so that the notice is clearly visible and will provide notice of the pesticide use to any person approaching the treatment area (IPMR s. 10 (6) (b)) **(see Explanatory Note page 28).**

Treatment notices must not be removed by the licensee for 48 hours after the pesticide use (IPMR s. 10 (4) (b)).

Written Notice Following Pesticide Use

Immediately following a pesticide use that required giving or posting a treatment notice, the licensee must provide written notice to the owner, manager, administrator or principal (or their agent), giving notice that the pesticide use occurred and of any differences between the information given in the treatment notice and the actual pesticide use (IPMR s. 10 (12)).

[5] This notice period may be shortened only with the consent of each person who has access to the proposed treatment area and is entitled to notice of the proposed use either in writing or by posted notice.
[6] So that the notice is clearly visible and will provide notice of the pesticide use to any person approaching the common area. Treatment notices must not be removed by the licensee for 48 hours after the pesticide use.
[7] This notice period may be shortened with the consent of each person who has access to the proposed treatment area and is entitled to notice of the proposed use either in writing or by posted notice.

Summary of the Treatment Notice Requirements for Landscape Pest Management

Type or Location of Pesticide Application	Give notice 72 hours before treatment	Post 48 hours before treatment	Post at time of treatment	No posting required
On the property of a school or child care facility	X[8]		X[9]	
Outdoor areas within 5 m of an entrance or window or an area maintained for recreation, public passage or parking on a multi-residence property		X[10]		
Outdoor, landscaped area of public land maintained for public passage or recreation			X	
Use of only Excluded pesticides				X
Insect baits used in bait stations placed in concealed locations not accessible to children or pets				X
Insecticide applied to an outdoor wasp nest				X
Herbicide used to manage weeds along fences or in cracks in the pavement on roads, sidewalks or parking lots				X
Granular pesticides used in flower, vegetable or shrub beds and mixed into soil				X
Offices, shopping malls and other work places	**Follow WorkSafe BC Requirements**			

Information to be Included in a "Treatment Notice"

A Treatment Notice must contain all of the following information (IPMR s. 63 (1)).

(see Explanatory Note page 28):

- A description of the area to be treated;
- Name of the targeted pest;
- The federal *Pest Control Products Act* registration number of the pesticide to be used and its active ingredient;
- Proposed date and start time, and proposed alternate dates and times of the pesticide use;
- Name and licence number of the licensee and a phone number at which the licensee or an employee can be reached for more information about the proposed pesticide use;
- Precautions that should be taken to minimize exposure to a pesticide or its residues, including a statement that indicates the period following the use during which people should not enter the treated area (re-entry period); and
- If fruit-bearing trees or other food crops are treated, the number of days before food can be harvested safely.

[8] Provide notice to the school or facility administrator.
[9] A posted notice is required if pesticide is used on the outdoor public use area of these properties.
[10] Also provide notice to the building owner or manager.

Characteristics of a Posted Treatment Notice

When the regulations require a Treatment Notice to be posted, it must have the following characteristics (IPMR s. 63 (2)):

- For signs posted in outdoor areas, they must be at least 550 cm^2 in size (a letter size sheet of paper), or for signs posted in indoor areas, they must be at least 200 cm^2 in size (one half a letter size sheet of paper).
- If the notice may be exposed to water, it must be constructed of water resistant material.
- Use type or letters that are clearly legible to a person approaching the treatment area.
- The notice must contain a cautionary symbol (such as a stop sign or raised hand) that will draw the attention of a person approaching the treatment area.
- The notice must display, in bold block letters, the words "NOTICE OF PESTICIDE USE" – or in place of the word "pesticide," the word "insecticide," "herbicide," or another category of pesticide.

Situations When the Notification Requirements May Be Altered

The provision and posting of a treatment notice (except to the owner or manager, or their agent, where required) for pesticide use in a multi-residence common area or outdoor public use area **is not required** if the pesticide is: (IPMR s. 12)

- ✧ an insecticide applied to a wasp nest that is outdoors, or is indoors and no person will have access to the treatment area within the 48 hour period after the use;
- ✧ a herbicide and is used to manage weeds along fences or in cracks in the pavement on roads, in sidewalks or in parking lots;
- ✧ a granular pesticide used in flower, vegetable or shrub beds and mixed into soil; or
- ✧ a bacterial pesticide applied to water.

The notice period before use of a pesticide in a multi-residence common area or on the property of a school or a child care facility may be shortened only with the consent of each person who has access to the proposed treatment area and is entitled to notice of the proposed use (either in writing or by posted notice) (IPMR s. 10 (10)).

2.5 General Requirements for Protection of People and the Environment

Under the *IPM Act* there are two general requirements that underpin the legislation (IPMA s. 3):

1. A person must not use, handle, release, transport, store, dispose of, or sell a pesticide in a manner that causes or is likely to cause an unreasonable adverse effect (adverse effect means harm to humans, animals or the environment). *Note: When considering how to comply with the more specific requirement of the Act or Regulation, a person must also consider whatever additional steps may be necessary to ensure there will not be an unreasonable adverse effect and to ensure that all pesticide label specifications are followed.*

2. A person must not use a pesticide in a way different than the manner specified on the label of the pesticide container.

2.6 Pesticide Transport, Storage and Use Standards for Protection of People and the Environment

Pesticide Transport (see Explanatory Note page 34):

Pesticides must be transported in a manner that is sufficient to prevent escape, discharge or unauthorized removal of the pesticide from the transport vehicle; and that prevents contamination of food or drink intended for human or animal consumption, or of household items such as furnishings, clothes, toiletries, or bedding (IPMR s. 33 (2)).

Pesticide Containment (see Explanatory Note page 34):

A pesticide must be kept, handled, stored or transported in the container in which it was originally packaged and with the label originally affixed by the manufacturer, or in an appropriately designed and labeled container[11] (IPMR s. 65).

Pesticide Storage (see Explanatory Note page 34):

Pesticides (other than domestic or excluded pesticides) must be stored in a storage facility that is (IPMR s. 66 (1) (b)):

- Separated from (and not used for storage of) food intended for human or animal consumption;
- Ventilated so that pesticide vapours are vented outside;
- Locked when unattended; and
- Accessible only to persons authorized by the person storing the pesticide.

Each door providing access to a pesticide storage facility must have a sign that is clearly visible to a person approaching, with the words "WARNING: CHEMICAL STORAGE – AUTHORIZED PERSONS ONLY" written in block letters. Fumigants and other pesticides that release vapours and bear a "poison" symbol on the label must be stored in a facility that is not attached to or within a building used for living accommodations.

Within 60 days after starting to store pesticides at a location, a pesticide licensee must provide notice of the storage location to the fire department responsible for fire protection at that location.

[11] One designed for the containment of the pesticide, with a label that displays the pesticide's trade name, the name and concentration of the pesticide's active ingredient and the pesticide's registration number under the federal Act. This requirement does not apply to tanks being used for mixing pesticides, or for holding pesticides during use.

Preparing for Pesticide Use (see Explanatory Note pages 38 to 41)

A licensee must ensure that (IPMR s. 71 (1)):

- Each individual who will be using a pesticide (for which the licence is required) is informed of:
  - The boundaries of the proposed treatment area,
  - The requirements for personal protection, and
  - The pesticide use procedures required to protect human health and the environment;
- The application equipment is in good working order and, if required, is calibrated to conform to the application rates on the pesticide label; and
- An inspection of the treatment area is carried out to ensure that the applicable regulatory requirements and standards can be met in carrying out the use.

Protecting People and the Environment

A licensee must ensure that the following precautions are taken in carrying out pesticide use (IPMR s. 71 (2)):

- Precautions to prevent unprotected human exposure to pesticide **(see Explanatory Note page 47);**
- Precautions to ensure that domestic water sources, agricultural water sources and soil used for agricultural crop production are protected for their intended use **(see Explanatory Notes page 43);** and
- Avoiding the use of pesticide over vertebrate wildlife or domestic animals that are visible to the user.[12]

A licensee **must not**:

- Engage in broadcast spraying or foliar spraying outdoors if the wind speed exceeds 8 km an **hour (see Explanatory Note page 50)** (IPMR s. 71 (7));
- Use a residual pesticide on water-saturated soil, during heavy rainfall or if heavy rainfall is imminent (IPMR s. 71 (9) (a));
- Spray a pesticide on foliage covered by ice or frost or if water is flowing on the foliage (IPMR s. 71 (9) (b)); or
- Spray a pesticide between 30 minutes after sunset and 30 minutes before sunrise unless a lighting device is used so that the person applying the pesticide and the pesticide use are clearly visible from a distance of at least 30 m. (IPMR s. 71 (8)).[13]

A container used to prepare, mix or apply a pesticide must not be washed or submerged in a body of water. Pesticides must be prevented from entering any body of water or irrigation system

[12] This provision does not apply if the pesticide is a bacterial pesticide (e.g., *Btk*).
[13] This is the amended requirement as of October, 2006.

used to draw water from for the containment, preparation, mixing or application of a pesticide[14] (IPMR s. 70).

A licensee must ensure that their use of an herbicide **does not** remove vegetation that is necessary to (IPMR s. 71 (10)):

- Prevent erosion of a streambank;
- Prevent debris that would cause an unreasonable adverse effect from entering a stream; or
- Maintain slope stability in areas where landslides have occurred.

If using a slug bait pesticide that may be harmful to children or domestic animals, a licensee must place the pesticide in bait stations that are resistant to tampering by children and animals, or in areas that are inaccessible to children and domestic animals (IPMR s. 71 (11)) **(see Explanatory Note page 52).**

No-treatment Zones

A 30 m no-treatment zone must be maintained around a water supply intake or well used for domestic or agricultural purposes (including water used for livestock or irrigation of crops) unless the licensee is "reasonably satisfied" that a smaller no-treatment zone is sufficient to ensure that pesticide from the use will not enter the intake or well[15](IPMR s. 71 (3), (4)) **(see Explanatory Note page 43).**

The licensee must ensure that a no-treatment zone between an outdoor pesticide use area and a body of water is sufficient to prevent the release of pesticide spray or runoff into the body of water (IPMR s. 71 (5)) **(see Explanatory Note page 41).**

The licensee must ensure that a no-treatment zone between an outdoor pesticide use area and an adjacent property is sufficient to prevent the release of pesticide spray or runoff onto the adjacent property (unless the adjacent property owner or manager agrees otherwise) (IPMR s. 71 (6)) **(see Explanatory Notes page 45)**.

2.7 Reporting and Record Keeping Requirements

If a licensee has not given prior notice to the Administrator through his or her licence application about the following pesticide uses, he or she must give written notice to the Administrator at least two business days before the first intended use of a pesticide on public land (IPMR s. 40).

Within 60 days after starting to store pesticides at a location, a pesticide licensee must provide notice of the storage location to the fire department responsible for fire protection at that location (IPMR s. 31).

Licensees are required to maintain a record of pesticide use for each treatment location or day of use that includes (IPMR s. 35):

[14] By maintaining a gap between the pesticide and the equipment used to draw water.
[15] A record must be kept of the information on which the decision was based for a smaller no-treatment zone that still ensures no pesticide enters the intake or well.

- If the use was performed as a service, the name and address of the person for whom the service was performed;
- If the service was performed for another licensee (or permit holder or Pesticide Management Plan [PMP] confirmation holder), the number of the person's licence (or permit or confirmation);
- If the use was not performed as a service, the name and address of the owner or manager of the treatment location;
- The name and certificate number of the certified applicator who used or supervised the use of the pesticide;
- The date and time of the pesticide use;
- The name of the pest targeted by, or the purpose of, the pesticide use;
- The trade name of each pesticide used and its registration number under the federal Act;
- For each pesticide used, the method and rate of application and total quantity used;
-  If the use was outdoors, the prevailing meteorological conditions, including temperature, precipitation and velocity and direction of the wind **(see Explanatory Note page 49);**
- Pest monitoring methods and injury thresholds used to fulfill the licensee's IPM requirements in relation to the use;
- Advice given to the owner or manager of the treatment area, including safe re-entry time, the number of days before a crop can be harvested safely (where applicable), and any additional precautions that should be taken to minimize exposure to the pesticide; and
-  If the licensee decided that a no-treatment zone around a water supply intake or well used for domestic or agricultural purposes may be reduced, the information on which the licensee based the decision. **(see Explanatory Notes page 43)**

Records must be kept up to date, at the business location identified on the licence application (except as required during pesticide use) and for a period of three years after the use or application to which they relate. A licensee may keep records relating to a pesticide use at or near the treatment location during the use, provided that he or she ensures that these records are at the business location within 60 days after the completion of the pesticide treatment to which they relate (IPMR s. 83).

Annual Report to the Administrator

A licensee must submit an annual report of pesticide use to the Administrator by January 31 of every year (for the previous calendar year's use). The annual report must include (IPMR s. 39 (1) (2)):

- The name and address of the licensee and their licence number;
- For each pesticide used in the calendar year, the trade name, registration number under the federal Act, active ingredient and amount in kilograms; and
- The total area treated.

The annual report of a licensee must also provide a separate record of the use of pesticides for another licensee or a permit or confirmation holder.

3. EXPLANATORY NOTES FOR SELECTED REQUIREMENTS

Introduction

Each explanatory note has the following format:

1. **Relevant Regulation Section(s):** a copy of the specific sections of the regulation that are relevant to the issue.

2. **Reason for the Regulatory Requirement:** what the Ministry expects will be achieved for the protection of human health and the environment and to promote use of integrated pest management.

3. **Background Information:** information that may be necessary to consider in determining how best to comply with the requirement

4. **Some Ways for a Licensee to Address this Requirement:** steps that a licensee should consider to comply with the requirement.

5. **Additional Information:** may include more extensive examples of treatment methods or record keeping forms or lists of references.

3.1 IPM Requirements

The explanatory notes in this section provide guidance for achieving compliance with the requirements to use integrated pest management as specified in Section 68 of the IPM Regulations. Integrated Pest Management is defined (Section 1 of the Act) as a process for managing pest populations that includes the following six elements:

a) planning and managing ecosystems to prevent organisms from becoming pests;

b) identifying pest problems and potential pest problems;

c) monitoring populations of pests and beneficial organisms, damage caused by pests and environmental conditions;

d) using injury thresholds in making treatment decisions;

e) suppressing pest populations to acceptable levels using strategies based on considerations of:
   i. biological, physical, cultural, mechanical, behavioral and chemical controls in appropriate combinations, and
   ii. environmental and human health protection; and

f) evaluating the effectiveness of pest management treatments.

While each of these elements is treated separately as a regulatory requirement, they are not mutually exclusive. All of them must be practiced together to develop an effective IPM program.

IPM programs are knowledge-based with a heavy emphasis on collecting information and assessing it prior to making management decisions. The Ministry recognizes that IPM programs will likely change and improve as people gain experience and as new products, tools and information become available. It is expected that for some pests and locations, pest managers will start with a simple IPM approach and move to a more detailed approach as more information is obtained. The initial approach may involve a quick assessment of the site and pest and an evaluation of treatment alternatives. This may lead to a more detailed site assessment, the testing and implementation of an ongoing monitoring program and further review of the pest biology and treatment options. A more advanced program for a site may include implementation of pest prevention, division of a site into areas that require different levels of maintenance, refinement of monitoring and injury thresholds in relation to the maintenance levels and testing and incorporation of a greater range of treatment methods.

3.1.1 Use of Preventative Measures Prior to Pesticide Use

Relevant Regulation Sections:

68(1) *Except as provided in section 7(1) [licence requirement exemptions], a licensee may use a pesticide only after doing all of the following in accordance with integrated pest management principles:*

(a) identify and implement, or identify and advise the owner or manager of the treatment area of reasonable measures to prevent pests.

Reason for this Regulatory Requirement:

When pest problems are prevented, pesticides are not needed. Minimizing pesticide use is a desirable precautionary approach to prevent harm to the environment and human health. Prior to pesticide use on a particular pest problem, prevention methods are to be evaluated and implemented when reasonable, or in the case of a service, the client is to be advised of any reasonable prevention methods and how these should be implemented to maintain pest problems at tolerable levels

Background Information:

Growing healthy plants to prevent pest problems is the key to successful IPM in landscapes. This means choosing the right plants when landscape areas are being designed and maintained and giving them the best growing conditions. Longer-term corrective management, for example, would consider replacing problem plants, rebuilding turf areas and redesigning landscape areas. Pest prevention can also includes proper disposal of waste (e.g., cuttings) and cleaning of equipment before transport to new sites to prevent spread of pests.

A landscape pest management service company has an obligation to identify and implement or identify and advise the customer of preventative measures for both residential and commercial properties. Implementing preventative measures should be the goal for on-going accounts (with the understanding and cooperation of the customer/client). Even for a single pesticide treatment for a customer, there must be a reasonable effort to determine whether there are preventative measures that could apply to a customer's problem. For common pest problems, it is expected that the pest manager will have researched pest prevention in advance and communicated this information to a customer verbally or by written handouts.

The landscape pest manager employed by an agency or organization such as a local government, parks board or school board should be implementing long-term management programs that incorporate pest prevention measures. They should also be involved with builders and landscape architects to choose appropriate plants that are more pest tolerant.

Examples of Preventative Measures:

There is considerable information about pest management in the Ministry of Environment publication *Integrated Pest Management Manual for Landscape Pests in British Columbia*, available from the following web site:

http://www.env.gov.bc.ca/epd/epdpa/eripm/landshtm/Content.htm

The information in this publication includes specific preventative measures for weeds, insects, plant diseases and mites in landscaped areas such as lawns and turf, flower beds, shrub beds, borders, hedges, fence lines, around buildings, sidewalks and parking lots.

Examples of preventative measures for landscape pests include the following:

Weeds

- Installing a paved or mulched mow strip under fence lines or around buildings to block weed growth and eliminate the need to use herbicides or trimmers;
- Filling cracks in asphalt or concrete sidewalks or surfaces with a sealant to remove weed germination sites;
- Using weed-free nursery stock and bedding plants to prevent the importation of weed seeds;
- Applying organic mulches or landscape fabrics to prevent weeds from emerging or becoming established;
- Planting suitable and aggressive ground covers and massed plantings that rapidly cover the soil surface and reduce the space, nutrients and light available for weeds;
- When designing and planting turf areas or when renovating or repairing damaged areas, plan for long-term weed management by ensuring that there is correct drainage, soil preparation and choice of turf grass cultivars;
- Selecting turf grass cultivars suited to local conditions and intended use;
- Using correct mowing practices by keeping the mower height between 5 and 7 cm. This gives the grass more leaf area, so it can grow more vigorously, with deeper roots that are better able to compete with weeds. The dense turf also shades the soil and prevents weed seeds from germinating;
- Using mulching mowers and leave the grass cuttings on the turf to provide nutrients; and
- Promptly repairing worn or damaged areas of turf.

Insects, Mites and Plant Diseases

- Using optimum site design with proper soil preparation, fertility and pH for the intended plants;
- Using proper horticultural and arboricultural practices, including good pruning and planting techniques, proper water management and drainage;
- Purchasing healthy, disease-resistant plantings;
- Avoiding monocultures by using a diversity of species and families of trees and shrubs;
- Removing and proper disposal of dead, infested and fallen twigs, leaves and fruit;
- Avoiding the use of fast-acting, high nitrogen fertilizers that promote succulent, susceptible plants; and
- Protecting trees and shrubs from injury by mowers, string trimmers, vehicles and equipment by using barriers, trunk protectors or temporary fences.

- Use good sanitation practices including disposal of waste cuttings and cleaning of equipment between jobs, as necessary, to reduce spread of weeds and diseases.

Some Ways for a Licensee to Address this Requirement:

- ✧ Maintain information sources such as books and web sites and a list of qualified professionals / consultants who can be contacted for information / advice on preventative measures for landscape pests;
- ✧ For each pest, compile a list of possible prevention methods and the conditions under which they may be appropriate;
- ✧ Develop handouts, pest notes, etc., to communicate pest prevention methods to clients;
- ✧ Keep a record of the prevention advice that was provided to the customer / clients / employees or was implemented. This could be recorded on the client invoice or as notes appended to Pesticide Use Records; and
- ✧ Train staff to recognize and communicate practical preventative measures that can be implemented on a site.

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(7), (8), (9), (10), (11), (12), (22), (23), (24), (25), (26), (27), (30).**

3.1.2. Pest Identification Prior to Pesticide Use

Relevant Regulation Section(s):

68 (1)(b) *Except as provided in section 7(1) [licence requirement exemptions], a licensee may use a pesticide only after doing all of the following in accordance with integrated pest management principles: identify pest species and pest complexes to be managed.*

35(1) *A licensee who uses a pesticide, other than a wood preservative, must keep a record containing the following information for each treatment location and day of use:*

(f) *the name of the pest targeted by the use or purpose of the pesticide use*.

Reason for this Regulatory Requirement:

Pests must be accurately identified so that the most effective pest management measures can be designed to take advantage of research on the biology of the identified pest or pest complex. Operational pesticide use records are to include the identification of targeted pests, to allow a person to confirm the pesticide product label directions allow use for that pest.

Background Information:

In many cases pest identification must be made to the species level either by identifying a particular life cycle or through characteristics of the damage that is occurring.

Correct identification is essential because monitoring, injury thresholds and treatment methods may be specific to a particular species. Some insect and disease problems cause very similar damage that can be mistaken for disorders caused by poor growing conditions (i.e., nutrient deficiency, high pH, or salt damage). Once a pest has been identified, information about its life cycle can be used to determine when and where treatments will have the greatest effect, what preventative measures would be most effective and what damage may be expressed if treatments are delayed or not conducted and which products and/or alternatives are effective in reducing numbers.

Some pests, particularly diseases, have similar symptoms and positive identification can only be made by a plant pathologist. Resources to assist in identifications can be found at local offices of the Ministry of Agriculture and Lands, Ministry of Forests and Range, Universities and Colleges, Agriculture and Agri-Foods Canada Research Centres, Canadian Food Inspection Agency, garden centres, botanical gardens and private pest management consultants. Species can be sent to the provincial Plant Diagnostic Laboratory, B.C. Agriculture, 1767 Angus Campbell Rd., Abbotsford, BC V3C 2M3, Phone 604-556-3126.

Some Ways for a Licensee to Address this Requirement:

- ✧ Implement a policy that no pesticides may be used before the pest problem is accurately identified;
- ✧ Ensure that your pesticide use records include the name of the identified pest(s);
- ✧ Have available appropriate reference materials, and preserved specimens that can be used for comparison, or other information sources for identifying pests (e.g., local experts);
- ✧ Train applicators in pest identification to be knowledgeable of the pests commonly found at proposed treatment locations and at specific times during the growing season; and
- ✧ Hire trained horticulturists who have taken courses in pest management from an approved training institute (see reference [30] for B.C. University College Horticulture Programs in Appendix 1).

Additional Sources of Information:

Further Information may be obtained from the following numbered references found at the end of the Explanatory Notes for this sector in Appendix 1: **(7), (8), (9), (10), (11), (12) (13), (19), (21), (30).**

3.1.3. Monitoring Pest Populations and Their Location

Relevant Regulation Section(s):

68 (1)(c) *Except as provided in section 7(1) [licence requirement exemptions], a licensee may use a pesticide only after doing all of the following in accordance with integrated pest management principles: monitor to determine the population of pests and their location.*

35 (1)(j) *A licensee who uses a pesticide, other than a wood preservative, must keep a record that includes the following information for each treatment location and day of use: pest monitoring methods and injury thresholds used to fulfill the licensee's integrated pest management requirements in relation to the use.*

Reason for this Regulatory Requirement:

Observations to identify where pests are located and their abundance, are required to determine if injury thresholds have or will be exceeded and to ensure that if a pesticide is used, it is only applied in areas requiring treatment. A record of monitoring methods is to be kept to confirm that monitoring was adequate to achieve these objectives.

Background Information:

Monitoring as an element of IPM is defined in the IPMA as "monitoring populations of pests and beneficial organisms, damage caused by pests and environmental conditions." In landscape pest management, monitoring is used to:

- Detect pest populations while pest numbers are still low;
- Assess the size and spread of a pest population and to predict future damage levels;
- Determine the numbers of natural enemies present and the effect they are having on the pest population;
- Determine conditions that contribute to the pest problem, e.g., poor pruning can reduce air flow that may result in increased mildew;
- Compare pest and/or damage levels with previous monitoring results to see if pest numbers are increasing or decreasing; and
- Record temperatures and rainfall to determine disease infection periods.

Visual inspections in the field are commonly used for landscape pests because specific monitoring (sampling) methods have not been developed for the large variety of plants and pests possible in landscapes. Visual inspections should be conducted on a representative number of plants, at regular intervals. The pest population and/or damage is estimated and recorded (e.g., percent of area infested with dandelions observed to be 10%). These visual inspections can be refined for better accuracy by using specific sampling methods that involve counting to give quantitative measures. Visual inspections and counts can be used to compare data from week to week, year to year, as long as the same methods are used. Examples of monitoring include:

- Counting numbers of insects per leaf on 20 leaves from 10 plants picked at random from a group of 50 plants;
- Assessing percent infestation of weeds in small plots, e.g. 10-20 plots per hectare of turf to obtain average for turf area;
- Number of insects caught on 10 sticky traps per area;
- Spots of honeydew on sampling cards placed under trees that correlates with aphid abundance on trees;
- Counting number of insects dropping onto beating tray when 10 taps of branches used per unit area;
- Counting number of lesions per leaf on 100 leaves per tree on 5 to 10 trees in an area; and
- Correlating level of pest injury that triggers a complaint (e.g. frass from feeding caterpillars falling on cars).

Monitoring should be conducted even when service is provided to a customer who requests a single treatment; a single visual inspection may suffice (e.g., an estimate of the number of larvae and/or damaged buds per branch). For on-going property maintenance, monitoring should be more precise, comprehensive and timely to determine whether the pest population / damage is increasing or decreasing.

The type(s) of monitoring methods used will depend on the pest (i.e. insect, mite, disease, weed), pest location (in soil, tree top), host (turf, shrub, tree, nursery), accuracy needed and the costs of each method in terms of time to complete and equipment required to undertake method.

Examples of monitoring forms are provided at the end of this note and have been adopted from those used by Dr. Michelle Gorman, IPM Coordinator, City of Victoria, Engineering and Parks Department, and are contained in the B.C. Ministry publication *Integrated Pest Management Manual for Landscape Pests in British Columbia*. There are a number of landscape industry computer programs used for scheduling routes that may be adapted to a monitoring record system.

Some Ways for a Licensee to Address this Requirement:

- ✧ Collect information on monitoring / sampling methods from pest management publications, local IPM practitioners, IPM experts and consultants and other jurisdictions with similar weather, pests and landscape plantings;
- ✧ Assess the usefulness of these methods for determining pest levels and their location for pests your company/agency manages;
- ✧ Develop a record keeping system for pest monitoring methods utilized and results at each maintenance site; retain these records so they can be used for continuity with staff and clients; and
- ✧ Establish goals for continuous improvement of monitoring with objectives for staff training.

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(7), (8), (9), (10), (11), (12), (13).**

Pest Monitoring Form

Date of Monitoring _____ **Name of Monitor** _____

Location of Pest Problem (address) _____

_____

___Initial Monitoring ___Follow-Up Monitoring ___2nd Follow-Up Monitoring

Pest Type: □ **Insect** □ **Mite** □ **Animal** □ **Fungi**
□ **Bacteria** □ **Physiological**

Pest Name and Life Stage Found _____

Pest Estimate:	□	**1.**	**Very few pests**
Density	□	**2.**	**Pests found in moderate numbers**
	□	**3.**	**Pests found in high numbers**
	□	**4.**	**Pests found in very large numbers**
Infestation:	□	**1.**	**Evenly distributed over entire plant**
	□	**2.**	**Mainly on the newer growth**
	□	**3.**	**Mainly on the older growth**
	□	**4.**	**Trunk, stems or branches**
	□	**5.**	**Roots**
Plant Damage:	□	**1.**	**None**
	□	**2.**	**Minimal**
	□	**3.**	**Noticeable damage**
	□	**4.**	**Damage affecting growth**
	□	**5.**	**Causing plant death**

Description of the Damage/Infestation _____

Percentage of Plants Damaged/Infested _____

Predators/Parasites Present _____

Host Plant Type: □ **Herbaceous** □ **Shrub** □ **Tree**
□ **Deciduous** □ **Evergreen** □ **Turf Grass**

Host Plant Common Name _____

Genus/Species/Cultivar (if known) _____

Growth Stage _____

Comments _____

Weed Monitoring Form

Date of Monitoring _____ **Name of Monitor**_____

Location of Weed Problem (address) _____

_____

___Initial Monitoring ___Follow-Up Monitoring ___2nd Follow-Up Monitoring

Weed Species or Type *	% Weed Cover/Species	% Total Weed Cover	Test Area # *

* Each test area at a location will generally be the same unit area (e.g., 5 m X 5 m)

Percentage of Weeds with Flowers or Seed Heads _____

Fertilizer Dates and Types Used _____

Seed or Turf Type _____

Frequency of Watering and Irrigation Type _____

Current Height of Grass or Turf _____

Frequency of Mowing _____

Thatch Accumulation _____

Previous Treatment History _____

_____

Comments _____

_____

_____

3.1.4. Determining the Injury Threshold for Each Pest and Applying it to the Determination of When to Use a Pesticide

Relevant Regulation Section(s):

68 (1)(d) *Except as provided in section 7(1) [licence requirement exemptions], a licensee may use a pesticide only after doing all of the following in accordance with integrated pest management principles: determine the injury threshold for each pest and apply them to the determination of when to use a pesticide.*

35(1)(j) *A licensee who uses a pesticide, other than a wood preservative, must keep a record that includes the following information for each treatment location and day of use: pest monitoring methods and injury thresholds used to fulfill the licensee's integrated pest management requirements in relation to the use.*

Definition (Section 1):
"injury threshold" *means the point at which the abundance of pests and the damage they are causing or are likely to cause indicates that pest control is necessary or desirable.*

Reason for this Regulatory Requirement:

Injury thresholds are to be determined and used to ensure that a pesticide will only be used if pest numbers have or will exceed the injury threshold and will cause unacceptable damage or impact. A record is to be kept to confirm that an injury threshold was determined.

Background Information:

The regulatory requirement means that a pest manager will have to determine the amount of damage that is unacceptable for a given site. Damage includes reduced economic values, reduced aesthetic values or increased nuisance from pests. For service companies this will generally mean discussing and obtaining agreement with the property owner / manager on the amount of pest damage that can be tolerated so that an injury threshold can be determined. Compared to commercial agriculture, injury thresholds have not been well developed for many landscape pests. Consequently, it may be necessary to set preliminary thresholds and then refine these as further data and experience is gained.

In IPM programs, deciding when to take action requires monitoring to determine when the injury threshold has been reached. Treatments are not made according to a predetermined schedule (i.e. calendar spraying). Treatments are only made when and where monitoring shows they are needed. The injury threshold depends on the pest and where it is. In landscape pest control, the injury threshold is influenced by such factors as:

- The location of the plant in the landscaped area;
- The perceptions and tolerances of the customer or people who use the landscaped site;

- What pest is involved and the likelihood of permanent injury or death to the plant (e.g., some plant diseases, root weevils and boring insects may cause death of the plant that they attack);
- The part of the host plant that is affected;
- Quarantine requirements (e.g. introduced pests affecting agriculture and forestry);
- Responsibilities to protect commercial agriculture (e.g. regional district bylaws);
- The cost and effectiveness of the treatment (the cost of treatment should not outweigh the level of damage that will result from no treatment;
- The potential impact of weather conditions on injury expression, (e.g. rainfall and diseases); and
- The overall vigor (health) of the affected plant.

Most pests only temporarily damage the appearance of landscape plants, therefore setting injury thresholds is usually related to aesthetic values. The location of the plant and the visibility of the damage are usually critical in setting the injury threshold. For example, in ornamental show gardens for public viewing, even slightly damaged roses may be unacceptable, while in a nature park, heavily damaged leaves at the top of a tree could be tolerated. Studies have shown that in high priority sites, less than 10% damage to plants was sufficient to cause the majority of respondents to consider a plant unacceptable (see Reference 34 in Appendix 1).

A useful step in establishing injury thresholds is to divide maintenance sites into categories according to the level of pest management service required. At minimum, a three-category system as outlined below is recommended:

- Class A – High Level of Service: These sites are high value, high visibility sites such as formal display beds in parks, residential front yards, fine lawns, golf and bowling greens, hanging baskets, botanical gardens, plant nurseries and conservatories.
- Class B – Moderate Level of Service: These are medium value and visibility sites, such as boulevards and medians, general park and playground areas, residential backyards and perennial borders in parks.
- Class C – Low Level of Service: These include low profile or low maintenance sites, such as nature parks, recreational areas, picnic areas, hiking trails, maintenance yards and industrial sites.

The B.C. Landscape and Nursery Association has prepared a landscape standard that utilizes six maintenance levels and describes weed control standards that can be used as injury thresholds for particular sites (see Reference 25 in Appendix 1).

Some other examples of injury thresholds used in landscape pest management include:

- 10% weed coverage in an annual shrub bed in a high profile site;
- Aphid honeydew measured at 1-2 drops honeydew / cm^2/4 hrs;
- 15-20 fungus gnats on yellow sticky cards set 20 m apart;
- >30 aphids per leaf per predator as an average on 10 leaves;
- 2 egg masses per branch for elm leaf beetle; and
- 0-10% of the foliage with symptoms of powdery mildew.

Some Ways for a Licensee to Address this Requirement:

- ✧ Establish a system for classifying maintenance sites according to the level of pest management service required;
- ✧ Review with clients or the property manager, the relevant factors to be considered in developing injury thresholds for a particular site (e.g., total plant care, ecological sustainability, pest and damage tolerance);
- ✧ Establish a process to ensure injury thresholds are established for the pest problems and sites serviced;
- ✧ Develop a system for recording injury thresholds for each treatment location and day of pesticide use (the model pesticide use record form issued by the Ministry of Environment on the IPM program website has a space for recording injury thresholds. This can be used or a company can develop their own form); and
- ✧ Establish goals for refining injury thresholds based on evaluations of treatment results and input from clients/property managers.

Additional Sources of Information:

Further information on injury levels for landscape pests in British Columbia may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(7), (10), (11), (12), (13), (24), (33) (34) (35).**

3.1.5. Selecting Pest Treatment Methods Based on Consideration of Practical Alternatives to Pesticide Use and Protection of Human Health and the Environment

Relevant Regulation Section(s):

68(1)(e) *Except as provided in section 7(1) [licence requirement exemptions], a licensee may use a pesticide only after doing all of the following in accordance with integrated pest management principles: select pest treatment methods based on consideration of practical alternatives to pesticide use, and protection of human health and the environment.*

Reason for this Regulatory Requirement:

The process for selecting a pest treatment must include a review and evaluation of practical alternatives to pesticides so that they will be used when appropriate to minimize pesticide use. Selecting pest treatments, particularly pesticides, also requires considering risk reduction to human health and the environment as a guiding principle (i.e., using least toxic pesticides and lowest possible application rates).

Background Information:

IPM involves consideration of all techniques to control pests. Cultural, physical, mechanical and biological methods are recognized as alternatives for managing insects, mites, plant diseases, weeds and other pests in landscapes.

Each pest management decision should be guided by the following principles:

- Alternatives to pesticides should be used where appropriate to minimize risk;
- When pesticides are necessary, a continuous effort should be made to improve the way they are used to reduce impact on non-target organisms; and
- Human health and the environment must be protected.

In selecting a treatment method(s), the following assessment criteria may need to be considered:

- Objectives of the management program (e.g. to reduce aesthetic damage or prevent death to valuable ornamental plantings and/or to comply with legal requirements for control – such as weeds under the *Weed Control Act*, compliance with Regional District bylaws and area wide IPM programs such as the Sterile Insect Release program in the Okanagan Valley);
- The urgency of the required treatment based on field observations, results of monitoring and injury thresholds and level of damage;
- The species of the landscape pest, and the location of, and accessibility to, the pest (e.g. on branches of a tall tree);
- Human health and environmental protection information (toxicity, environmental fate, etc.) from label warnings, material safety data sheets, internet sites and the Pesticide Handbook;
- The treatment site location with respect to adjacent property and environmental issues (e.g. proximity to domestic water sources, streams, lakes and rivers and wetlands, produce for human consumption, nearby residences and play areas);
- The required application methods / techniques, rates and timing;
- Benefits, limitations and cost effectiveness of each method and of combinations of methods (often several alternatives to pesticides can be combined with or without pesticides for a more effective program; and
- The consequences of not taking any action.

Membership with industry associations, attendance at meetings and workshops and receipt of newsletters can be an invaluable source of information on treatment methods and their evaluation by other agencies or companies (e.g., the B.C. Landscape and Nursery Association, Integrated and Environmental Pest Management Association, Western Turfgrass Association). In addition, companies or agencies developing IPM programs may find it best to contract out this work to specialists with local experience. Identification of options for specific pests and staff training, in particular, can be accelerated with the help of a qualified IPM practitioner.

Examples of Alternative Treatment Methods:

The examples provided below are but a few that are being used in British Columbia or referenced in pest management publications listed in Appendix 1.

Cultural Controls include removing pest breeding sites through proper sanitation and replacing susceptible plant varieties with resistant cultivars.

Physical Controls may include pulling weeds and installing pest barriers.

Mechanical Controls utilize vacuum equipment, cultivators, mowers and heat applicators.

Biological Controls – A number of companies (Evergro Westgro, the Bug Factory) provide a line of biological control agents.

Examples of Selective Pesticide Treatment Methods

Mating Disruption – using pheromones to confuse mating insects so that reproduction is inhibited

Insecticidal Baits – instead of broadcasting insecticide, insects are killed when they are attracted to small applications of insecticide-treated bait.

Spot Treatments – use considerably less pesticide than broadcast treatments.

Some Ways for a Licensee to Address this Requirement:

- ✧ For each common pest problem, compile information on alternatives to pesticides and the range of pesticide products registered for use against the pest in Canada (information on reduced risk and biological pesticides may be obtained from some pesticide suppliers and from the internet site http://www.epa.gov/pesticides/health/reducing.htm or by contacting the Pest Management Regulatory Agency National Pesticides Call-Line at 1-800-267-6315);
- ✧ Develop a treatment selection process using the principles and criteria such as those outlined in the background information above;
- ✧ Use the process to select appropriate treatments for common pest problems your company/agency deals with – keeping a record of reasons for the choices, particularly if alternatives or reduced risk pesticides are not selected;
- ✧ Ensure applicators use the appropriate selection process and documentation if it is left to them;
- ✧ Establish a policy for your organization to incorporate alternatives to pesticide into their pest management program where practical; and
- ✧ Establish a process for ongoing review of the selection of treatment methods as new methods and information from treatment evaluations become available.
- ✧ Obtain the services of an IPM specialist to assist with the development of treatment options.

Additional Sources of Information:

Further information on treatment methods may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(7), (8), (9), (10), (11), (12), (13), (21), (23), (24), (30).**

3.1.6. Evaluating the Effectiveness of Pesticide Use

Relevant Regulation Section(s):

68(2) *Except as provided in section 7(1) [licence requirement exemptions], a licensee, after each pesticide use, must evaluate, in accordance with integrated pest management principles, the effectiveness of the use.*

Reason for this Regulatory Requirement:

Evaluating the effectiveness of a pesticide use guides decision making on subsequent pest management options for similar pest problems.

Background Information:
To evaluate an IPM program, the pest manager needs accurate records of treatments and results of:

- Observations of pest numbers and their locations before treatment;
- The injury threshold that was established for the pest before treatment;
- Treatment specifics, including treatment dates, pesticides used, application rates used;
- Observations of pest levels or damage after treatment; and
- Non-target effects.

These observations can be used to help to determine if:

- The targeted pest was affected by the control option chosen, and if the level of control was acceptable (i.e., treatment objectives were met);
- The treatment method used was appropriate based on selection principles identified in the previous Explanatory Note;
- The pesticide and the application rate / method were appropriate based on the evaluation of the results; and
- There was off-site pesticide movement or non-target effects.

Some Ways for a Licensee to Address this Requirement:

- ✧ Develop procedures for evaluating the effectiveness of pesticide treatments for the common pests being managed (these may include quantitative sampling or visual observations);
- ✧ Conduct post-treatment evaluations for representative pesticide treatments of a pest in a bio-climatic zone, when appropriate;
- ✧ For ongoing management of a property, combine evaluation observations with the regular monitoring program observations or maintenance schedule; and
- ✧ Develop and use a record keeping system for evaluation observations and assessment results. An example of a form is at the end of this note.

Additional Sources of Information:
Further information on evaluating treatment effectiveness may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(6), (7), (8), (9), (10), (11), (12), (22), (23), (25), (30)**.

Generic Form for Recording Post Treatment Evaluations:

The following is an example of a form that could be used, or adapted for use, in conducting landscape post treatment evaluations.

Post Treatment Evaluation Form

Date of Treatment: _____ **Date of Post Treatment Evaluation** _____

Pest Type: ☐ **Insect** ☐ **Mite** ☐ **Animal** ☐ **Fungi**
☐ **Bacteria** ☐ **Physiological** ☐ **Weed**

Treatment Location (attach map or diagram if needed) _____

APPLICATION INFORMATION:

Treatment Method _____

Pesticide(s) Applied:	**Product Name**	**Active Ingredient**	**PCP Number**
	_____	_____	_____
	_____	_____	_____

Application Rate for Each Product Applied: (L/ha, Amount of Product in Backpack, etc.)

_____

Area Treated (ha): _____ **Type of Application Equipment:** _____

Target Vegetation: (List all species or complexes treated) _____

Non-Chemical Treatments Used: **YES** ☐ **NO** ☐

Describe Non-Chemical Treatments Used: _____

EVALUATION RESULTS:

Type of Evaluation Conducted (Visual, Counting) _____

Results of Evaluation (Compared to Pre-Treatment Injury Thresholds) _____

_____

Pest Damage/Infestation Observed _____

Percentage of Plants/% of Area Damaged/Infested _____

Treatment Objectives Achieved **YES** ☐ **NO** ☐

Describe how/where objectives were/were not achieved _____

_____

Recommended Further Action or Management: _____

_____

3.2 Public Notification Requirements

The following Explanatory Note provides guidance on the content of treatment notices and where notices should be posted when a pesticide is used in areas defined under the regulations as "multi-residence common area," "multi-residence restricted areas" and "outdoor public use areas."

3.2.1. Notification Requirements for Pesticide Use in Outdoor Public Use Areas

Relevant Regulation Sections:

Section 10(1) In this section: ***"multi-residence common area"*** *means*

(a) an indoor area of a multi-residence property to which all or most occupants of the property have access, and
(b) an outdoor area of a multi-residence property that is
  i. Within 5 m of an entrance or a window to living accommodations, or
  ii. Maintained for purposes of passage, parking or recreation;

*"**multi-residence restricted access area"** means an area of a multi-residence property that*

(a) is not used or intended to be used as living accommodation, and;
(b) is not accessible to the general public and most occupants of the property;

"outdoor public use area" *means an outdoor, landscaped area of public land that is maintained for purposes of public passage or recreation.*

Section 10(4) *At least 48 hours before using a pesticide in a **multi-residence common area**, a licensee must*

(a) provide a treatment notice that complies with Section 63(1) to the owner or manager of the building or the agent of either, and
(b) either
  i. provide a treatment notice that complies with Section 63(1) to each person who has access to the common area within 48 hours after the use, or
  ii. post a treatment notice that complies with Section 63(1) and (2)
    1. at each entrance to an indoor treatment area
    2. if the common area is an outdoor area that is not fenced, at intervals around the common area so that the notice is clearly visible and will provide notice of the pesticide use to any person approaching the common area which treatment notice must not be removed by the licensee within 48 hours after the pesticide use.

Section 10(5) *A licensee who uses a pesticide in a* ***multi-residence restricted access area*** *must*

(a) before or immediately following the use, provide a treatment notice that complies with Section 63(1) to the owner or manager of the building or the agent of either, and
(b) either
  i. provide a treatment notice that complies with Section 63(1) to each person who has access to the treatment area within 48 hours after the use, or
  ii. immediately following the use, post a treatment notice that complies with Section 63(1) and (2) at each entrance to the treatment area, which notice must not be removed by the licensee for at least 48 hours after the pesticide use.

Section 10(6) *Before using a pesticide in an* ***outdoor public use area*** *(see definition above), a licensee must post a treatment notice that complies with Section 63(1) and (2)*

(a) if the treatment area is fenced, at each gate or opening that provides access to the area, and
(b) if the treatment area is not fenced, at intervals around or along the area as necessary so that a notice is clearly visible and will provide of the pesticide use to any person approaching the area.

Section 63(1) *A treatment notice must contain all of the following information:*

(a) description of the treatment area;
(b) name of the targeted pests;
(c) the registration number under the federal Act of the pesticide to be used and its active ingredient;
(d) proposed date and start time of the pesticide use and proposed alternate dates and times of the pesticide use;
(e) name of licensee and licence number;
(f) a phone number at which the licensee or an employee can be reached for more information about the proposed pesticide use;
(g) precautions that should be taken to minimize exposure to the pesticide or its residues, including, without limiting this, specifying the period following the use during which people should not enter the treatment area; and
(h) if fruit-bearing trees or other food crops are treated, the number of days before food can be harvested safely.

63 (2) *If a treatment notice is required to be posted, the treatment notice must:*

(a) if posted in an outdoor area, be at least 550 square cm in size and if posted in an indoor area, be at least 200 square cm in size
(b) If it may be exposed to water, be constructed of water resistant material;
(c) Use type of letters that are clearly legible to a person approaching the treatment area;
(d) Contain a precautionary symbol, like a stop sign or a raised hand, that will draw the attention of a person approaching the treatment area; and
(e) Display, in bold, block letters, the words "NOTICE OF PESTICIDE USE" or in place of the word "pesticide", the word "insecticide", "herbicide" or another category of pesticide.

Section 12(a)(b)(c)(e)(f) *A licensee is exempt from posting requirements outlined in Section 10(6) if conducting the following treatments:*

(a) the pesticide is insecticide applied in cracks and crevices;
(b) the pesticide is insect gel, or insect bait in a bait station, that is placed in a concealed location not accessible to children or pets;
(c) the pesticide is insecticide applied to a wasp nest that
  i. is outdoors, or
  ii. is indoors and no person will have access to the treatment area within the 48 hour period after the use,
(d) the pesticide is herbicide and is used to manage weeds along fences or in cracks in the pavement on roads, in sidewalks or in parking lots,
(e) granular pesticide is used in flower, vegetable or shrub beds and mixed into soil.

Reason for this Regulatory Requirement:

Requirements for the content, size, location and timing of the posting of treatment notices are to give people access to information to allow them to make a decision to avoid a recently treated area or to take recommended safety precautions for entering a treated area. Advance notice (48 hours) is considered to be necessary before pesticide use in multi-residence common areas since it may determine how a person accesses or uses their residence and property.

Certain types of pesticide use are exempt from the requirement to post treatment notices because there is almost no likelihood of exposure for a person entering the treatment area.

Background Information:

Treatment Notice Size
The minimum size of the treatment notice for outdoor posting is about standard letter size (22 x 28 cm). The notice is to be clearly visible to a person approaching a treated area. It may be appropriate to increase the size of the notice so that it can be posted at less frequent intervals around the treatment area and still meet the "clearly visible" requirement.

Treatment Notice Content
The following notes are to assist writing each of the content requirements.

(a) **Description of the treatment area** – must be specific enough to allow the reader to accurately identify the area being treated. Examples include:

- Kingston Community Centre playing field;
- Cherry trees on boulevard of the 1200 to 2200 blocks of Main Street;
- Roses in the south-west garden beds Ashton residence manor house.

(b) **Name of the Targeted pest** – describe either the pest or the pest complex. Be specific enough to allow the reader to confirm that the pest is listed on the pesticide label (e.g. leafrollers, powdery mildew, broadleaf weeds).

(c) **The registration number and active ingredient(s) of the pesticides to be used** – these are PCP Act Registration numbers and the active ingredients under the "Guarantee" on the pesticide label.

(d) **Date and start time and any proposed alternate dates for pesticide use** – are to be listed so that the public knows when the treatment was done or is to be done. An alternate date and time should be provided if a treatment may be postponed due to adverse weather conditions (e.g. rain or winds over 8 km/hr). The alternate date is not to be used to identify possible retreatments – new notices should be posted close to the actual treatment date.

(e) **Name of licensee and licence number and a phone number of the licensee where a person can obtain more information** – where a person can obtain information on the treatment method or what will be or was treated.

(f) **Precautions to minimize exposure to a pesticide or its residues, including the period during which people should not enter a treated area** – when such precautions are specified on a label or Material Safety Data Sheets, these should be included on the posted notice. A typical precaution is to avoid contact with treated areas. For unprotected worker re-entry to a treated site, WorkSafeBC has identified minimum re-entry times. These should be placed on the notice when appropriate. These can be found at http://www2.worksafebc.com/Publications/OHSRegulation/Part6.asp?_from=regulation.healthandsafetycenter.com

(g) **The number of days before food can be harvested safely** – refers to the number of days after pesticide application that must be waited before the food crop can be safely and legally harvested or picked. This information is found on all labels of pesticides registered for use on food crops and must be adhered to under the Federal Food and Drugs Act.

Locations for Treatment Notice Posting

The primary aim of posting treatment notices is to ensure that individuals entering a treatment area are aware that treatment will occur near their residence, or for general public areas so that individuals are alerted that treatment occurred, before they enter the treatment area. Suggested locations for posting include:

- So that it can be seen as a person approaches each gate or opening to a treatment that occurs within a fenced area; and
- At intervals around the treated area so that a notice will be clearly visible to anyone approaching the treated area from the different directions that it may be accessed. The spacing of notices will depend on the size of the notice and lettering. Notices should generally be posted beside paths leading to a treated area.

Note that the regulations specify posting is required when pesticide is used in outdoor public use areas defined as landscaped areas maintained for public passage or recreation. The ministry considers examples of these areas to be:

- the turf in parks;
- the ornamental beds in parks where people walk or play and areas immediately adjacent to them;

- school playgrounds and fields;
- the land around bus stops and rest areas and points of interest; and
- boulevards in residential and commercial areas (where people may walk across them).

Examples of areas that the ministry considers do not require posting are boulevards and medians along highways or in industrial areas, away from residential or commercial buildings and stopping areas.

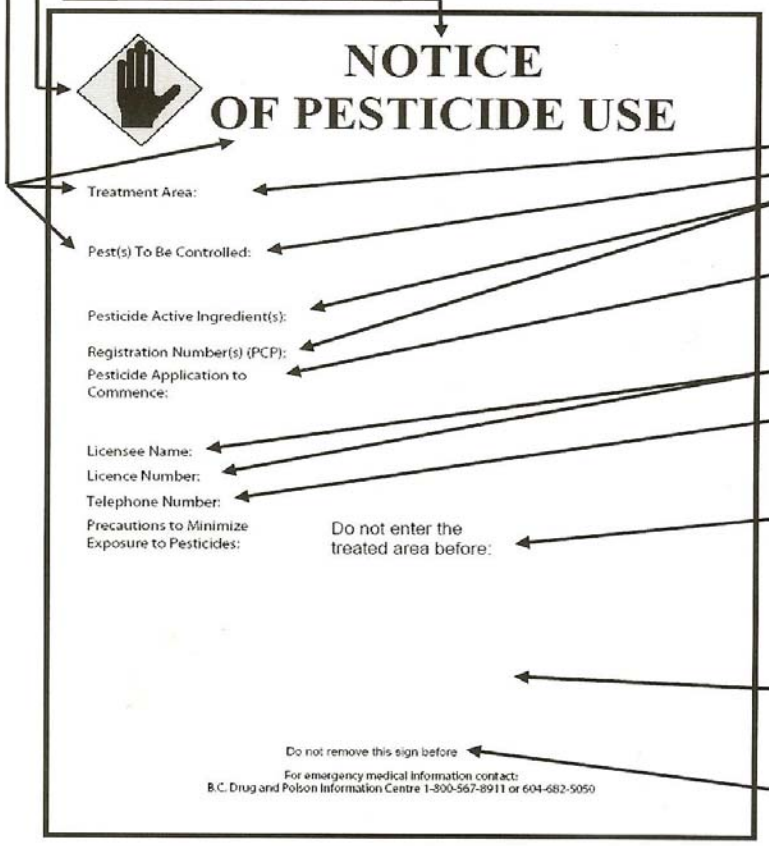
Some Ways for a Licensee to Address this Requirement:

- ✧ Develop a treatment notice template if pesticide is to be used in areas that require posting of treatment notices. The treatment notice template on the ministry website is available to print and laminate. See the following web address: http://www.env.gov.bc.ca/epd/epdpa/ipmp/pesticide_pdfs/treatment_notice.pdf. The ministry template and directions for its use follows this section. Licensees can also make their own specialized form as long as it has the required information;
- ✧ Identify the precautions that should be placed on treatment notices for the common pesticides that will be used;
- ✧ Evaluate where notices need to be placed. If necessary obtain information from the land manager / clients about areas maintained / used for public recreation or passage;
- ✧ Train applicators to recognize when treatment notices are required, when and where they need to be posted and the information to be placed on the notices;
- ✧ Laminate paper notices or use plastic material so the posted notices will be resistant to water as may be required, and
- ✧ Keep copies of at least the treatment notice template(s) used. It may be appropriate to develop a process to verify that staff have posted the required notices which could include records of each notice with a note regarding the posting locations for each pesticide use site. These could be attached to “client records” or to the applicable pesticide use record.

Example of a Landscape Treatment Notice:

The **Treatment Notice Form** must:

- If posted in an outdoor area, be at least 550 square cm in size (approx. = letter-sized paper) and if posted in an indoor area, be at least 200 square cm in size (approx. = $^1/_2$ of letter-sized paper);
- If it may be exposed to water, be constructed of water resistant material (use plastic signs with waterproof markers or laminate paper signs after printing);
- Use type or letters that are clearly legible to a person approaching the treatment area;
- Contain a precautionary symbol, like a stop sign or a raised hand, that will draw the attention of a person approaching the treatment area; and,
- Display, in bold, block letters, the words "NOTICE OF PESTICIDE USE" or, in place of the word "pesticide", the word "insecticide", "herbicide" or another category of pesticide.



The **Treatment Notice Content** must contain all of the following information:

- Description of the treatment area;
- Name of the targeted pests;
- The name(s) of the pesticide's active ingredient(s)and the pesticide's PCP Act registration number;
- Proposed date and start time of the pesticide use and proposed alternate dates in addition to times of the pesticide use;
- Name of licensee and licence number;
- A phone number at which the licensee or an employee can be reached for more information about the proposed pesticide use;
- Precautions that should be taken to minimize exposure to the pesticide or its residues, including, without limiting this, specifying the period following the use during which people should not enter the treated area; and,
- If fruit-bearing trees or other food crops are treated, the number of days before food can be a harvested safely.
- The sign must not be removed by the licensee for at least 48 hours after the pesticide use.

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(1), (4).**

3.3 Standards for Pesticide Transport, Storage and Use

3.3.1. Pesticide Containment, Transport and Storage

Relevant Regulation Sections:

66(1) *Pesticide, other than excluded pesticides and domestic pesticides, must be stored*

(a) separately from food intended for human or animal consumption, and
(b) in a storage facility that is
- *i. ventilated so that pesticide vapours are vented to the outside,*
- *ii. not used for the storage of food intended for human or animal consumption,*
- *iii. locked when unattended, and*
- *iv. accessible only by persons authorized by the person storing the pesticide.*

66(2) *Each door providing access to a facility described in subsection (1)(b) must bear a sign that*

(a) has the words "warning" chemical storage – authorized persons only" written in block letters, and
(b) is clearly visible to a person approaching the door.

65(1) *Pesticide must be kept, handled, stored or transported*

(a) in the container in which it was originally packaged and with the label originally affixed by the manufacturer, or
(b) in a container designed for containing the pesticide and labeled in accordance with subsection (2).

(2) *For the purposes of subsection (1)(b), a label must display*

(a) the trade name of the pesticide,
(b) the name and the concentration of the active ingredient in the pesticide, and
(c) the pesticide's registration number under the federal Act.

65(3) *Subsections (1) and (2) do not apply to tanks being used for mixing pesticides for or holding pesticides during use.*

Section 33(2) *A person who transports or causes or allows the transport of a pesticide must ensure that the pesticide is secured and transported in accordance with the applicable standards prescribed in Division 7 [Standards for Use, Containment, Transport, Storage or Sale of Pesticide] of Part 2 and in a manner that prevents*

(a) the escape, discharge or unauthorized removal of the pesticide from the transport vehicle, and
(b) the contamination of food or drink intended for animal or human consumption, household furnishings, toiletries, clothing, bedding or similar items that are transported with the pesticide.

Reason for this Regulatory Requirement:

These requirements are to protect people, domestic animals and the environment in relation to stored and transported pesticides by:

- Preventing pesticides being mistaken for other products;
- Ensuring the pesticide label information is on the container or can be obtained by use of the Product Registration Number;
- Preventing contamination of human and animal food, household furnishings, toiletries, clothing, etc.;
- Minimizing exposure of people to vapours;
- Preventing unauthorized use, theft, vandalism, escape or discharge; and
- Providing a warning on facilities where pesticides are stored.

Background Information:

Pesticide Container and Labeling Standards
Containers used to hold pesticide in an emergency (e.g., if the original container is leaking) must have a label with basic information to identify the pesticide to eliminate accidental exposure or being mistaken for other products. This basic information must include the pesticide trade name, name and concentration of the active ingredient and the product PCPA registration number.

This is a temporary fix and a full product label should be obtained as soon as possible **(see Reference 4 in Appendix 1 for pesticide label search website).**

Storage and Transport Separate from Food, Feed and Other Products
Storing pesticides separately from food intended for human and animal consumption prevents contamination via vapours, pesticide spills, or accidental mistakes. Food for animal consumption includes pet food, wild bird seed, feed for horses, cows and other farm animals, food supplements and additives (such as vitamins) and mineral / salt blocks. The same requirement applies to transporting pesticides and, in particular, furnishings, toiletries, bedding, and clothing require protection. Consider separate storage compartments for personal protective equipment and any food item.

Ventilation
Pesticide storage areas (including mobile units) must be ventilated to the outside atmosphere. The reason for ventilating pesticide storage areas is to minimize the possibility of exposure to pesticide vapours for staff entering the storage area, or for staff working within a building that houses the storage area. The types of products, formulation and quantities will determine whether passive ventilation (roof, well and gable vents, secured screened windows) is sufficient or whether powered ventilation is required (exhaust fans). In general, the higher the release of vapours and more toxic the pesticide, the more ventilation will be required. A facility with 5 or more containers of commercial insecticides and fungicides will likely require powered ventilation. Pesticides in a truck may be adequately vented by small cracks in the storage compartment, provided that a person can reach from the outside to grab the container. If a person has to enter bodily into the truck compartment to obtain a pesticide container, vent holes and possibly powered vents should usually be installed. Guidance may be obtained from the WCB Standard Practices for Pesticide Applicators and Material Safety Data Sheets for specific pesticide products.

Security of Pesticides in Transit and Storage
Pesticides, including filled spray units, in storage areas (including mobile units) must be protected against potential theft, vandalism and accidental release when left unattended. "Danger chemical storage – authorized persons only" signs are available from Regional offices in Prince George, Penticton or Surrey. Equip spray vehicles with appropriate locks and compartments so that sprayer/containers of pesticides cannot be tampered with or stolen when left unattended.

Some Ways for a Licensee to Address this Requirement

- ✧ Review procedures for and conduct regular audits of storage of commercial pesticide (including mobile units) to ensure safe practices and to document the adequacy in meeting the regulation requirements; and
- ✧ Install effective venting systems to remove pesticide vapours away from stored pesticides as documented in references (2)(3) located in Appendix 1. Select the storage facility site that makes it possible to vent pesticide vapour to the outside.

Additional Sources of Information:

The Agrichemical Warehousing Standards Association (part of Crop Life Canada) has established standards for the storage of Commercial pesticides used for crop protection. Licensees and confirmation holders storing large quantities of pesticides may wish to refer to these standards. Information about the standards can be accessed through the following web site: www.AWSACanada.com

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(2), (3), (6).**

3.3.2. Equipment Maintenance and Calibration

Relevant Regulation Section:

71(1)(b) *A licensee, for the purposes of a pesticide use for which a licence is required, and a confirmation holder for the purposes for which the confirmation is required, must do all of the following before the pesticide use: ensure that the application equipment is in good working order, and, if required, is calibrated to conform with the application rates on the pesticide label.*

Reason for this Regulatory Requirement:

This requirement is to protect applicators and the environment from leaking application equipment and to ensure application rates are consistent with label directions.

Background Information:

Regular maintenance of spray equipment is important to ensure that the equipment is safe and operating properly. The critical maintenance issue for environmental and worker protection is to inspect and, when needed, to replace seals, valves, hoses and pumps to prevent leaks. An example of an equipment maintenance record is the following table adapted from the WorkSafe BC publication "Standard Practices for Pesticide Applicators".

Calibration is required when equipment is new and also at regular intervals and when nozzles or pesticide formulation are changed (brass nozzles wear out quickly and may need replacing frequently). Many landscape treatments simply call for a treatment of a specified dilution on a "spray-to-wet" basis, so calibration may only require checking that the nozzle is spraying uniformly. When treatments require a broadcast treatment of a specified amount per unit area, calibration will also require measuring the delivery rate on a test area that approximates typical operating conditions.

Some Ways for a Licensee to Address this Requirement:

- ✧ Develop and implement a schedule for equipment inspection and maintenance, particularly following manufacturers' maintenance instructions for hose connections, gaskets, washers, pumps, valves and filters.
- ✧ Calibrate application equipment before use, when new, at the beginning of each application year and at intervals during the application season, especially after changing nozzles or pesticide or formulation.

Example of Format for Equipment Maintenance/Inspection Record

Equipment (Make, Model, Principal Operator)	Critical Part(s) Inspected	Date Inspected	Next Inspection Due	Conditions Found	Action Taken

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(2), (3), (16).**

3.3.3. Requirements for Pre-Treatment Inspection of Treatment Areas and Briefing Applicators of Requirements

Relevant Regulation Section(s):

71(1) *A licensee, for the purposes of a pesticide use for which a licence is required, must do all of the following before the pesticide use:*

(a) ensure that each individual who will be using the pesticide is informed of:

i. the boundaries of the proposed treatment area;
ii. the requirements for personal protection; and,
iii. the pesticide use procedures required to protect human health and the environment.

(c) carry out an inspection of the treatment area to ensure that the applicable regulatory requirements and standards can be met in carrying out the use.

Reason for this Regulatory Requirement:

Before each pesticide use:

- All pesticide applicator staff are to be adequately informed so they can ensure pesticide is not applied outside a pre-determined treatment boundary (with appropriate no treatment zones around water bodies and adjacent property) and so that they know what personal protection and what application procedures to use to protect human health and the environment.
- There is to be confirmation that the regulatory requirements can be met for the proposed treatment area and method of application.

Background Information:

Inspection of Treatment Area

An inspection of each proposed treatment area is required. This may be immediately before pesticide use or for more complicated sites, a few days or weeks before treatment to allow time to obtain information such as location of wells and property boundaries, or to obtain approval for spray landing on adjacent property. The inspection should be followed by an assessment as to whether the regulatory requirements can be met and how (see the specified regulatory requirements in **Section 2.6** of this document).

A key part of the inspection is to clearly identify treatment area boundaries that will, for given application procedures, prevent the release of spray or runoff into water bodies or the property of an adjacent owner. Water bodies include any natural pond or wetland as well as, creeks, streams, rivers, lakes and the sea. Preventing release of spray means that no spray droplets should be visible on the ground in that area.

The following pre-treatment procedures should be considered to ensure that treatment area boundaries are identified, clearly marked (if necessary), and known to everyone involved in the pesticide application:

- Identify and make a record of areas requiring protection (see examples below). The record could be in the form of a map, diagram or written notes;
- If necessary contact the owner / manager of adjacent properties to obtain permission for spray release on that property (e.g., if trees to be treated overhang or are beside the property boundary). To avoid spray on an adjacent property, it may be possible to direct spray from the property boundary toward the centre of the treatment property. There would have to be no wind or wind blowing from the adjacent property.
- Establish adequate no treatment zones (buffer zones) from bodies of water and adjacent property to ensure spray from treatment equipment will not reach those areas (this may require testing of equipment beforehand, but adjusted on site for wind conditions);
- If necessary, mark the treatment boundaries (e.g., with flagging tape) to ensure they will be recognized; and
- All personnel involved in pesticide applications should be provided with a copy of any maps or notes on what should be protected, and application procedures. Development, re-zoning and changes in ownership may make it necessary to frequently update records of property boundaries.

During the inspection of the proposed treatment area, examples of features to look for and record as needing protection during pesticide use include:

- Domestic water supply intakes, wells or other domestic water sources;
- Water supply intakes or wells used for agriculture, including water for livestock or for irrigation of crops;
- Natural bodies of water (creeks, ponds, wetlands);
- Drainage systems such as storm drains and ditches that drain into natural water bodies;
- Areas where the removal of vegetation may cause erosion of a stream bank or debris to be released into a stream;

- Childrens' play areas, especially day-care facilities or camp grounds with play structures, toys and picnic tables;
- Areas adjacent to buildings with open windows or doors;
- Areas adjacent to outdoor eating/picnic areas, swimming pools, fish ponds, exposed decks, or clothes on clothes lines;
- Areas containing food plants for human consumption (e.g., community gardens) or soil that, if treated, would no longer be suitable for its intended agricultural use;
- Areas frequented by the public, e.g. walking paths;
- Wildlife habitat (e.g., ecological reserves, Nature Trust lands, Ducks Unlimited properties);
- Visible vertebrate wildlife, domestic animals and pets;

Requirements for Personal Protection

All pesticide labels contain requirements for protective clothing and equipment (e.g., gloves coveralls and respirators) for reducing exposure to pesticides. Those who handle pesticides (especially non-certified staff) must be informed of the types of protective clothing and equipment that must be used for each product.

Briefing Topics for Applicators

The following are examples of topics to be discussed and evaluated with applicators following the pre-treatment inspection of the proposed treatment area:

- The pest(s) being targeted and their location;
- Pesticide label directions, requirements and restrictions;
- Personal protection requirements;
- Location of the treatment area boundaries;
- The types of and location of features requiring protection and appropriate no-treatment zones around them;
- The need to obtain permission from or otherwise inform adjacent property owners of the pesticide use;
- Precautions to take to prevent exposure of bystanders and domestic animals;
- The form, content and locations for posting of treatment notices, and/or the need to provide them to individuals;
- Appropriate application equipment, application rate and procedures (e.g. to minimize drift) for the pest and site;
- The need to monitor and record weather conditions (e.g., wind direction and velocity), and what adverse conditions require pesticide use to be stopped / suspended (e.g., wind, rain, frost, high water table);
- Basic toxicity and environmental fate of the pesticide(s) to be used;
- Spill response procedures.

Some Ways for a Licensee to Address this Requirement:

- ✧ Implement a policy / procedure that requires a licensee representative to inspect the treatment area with the client / land manager before treatment to confirm and record treatment area boundaries, the location of features that require protection, and any special notification procedures for adjacent property owners that must be met (the latter could be a written note on an invoice, work order or route map);
- ✧ Assess information gathered from pre-treatment inspections and develop a standard set of procedures (e.g. No-Treatment Zones (NTZs) and best management practices) to protect human health and the environment during typical pesticide use situations;
- ✧ Develop procedures and checklists of topics for ensuring applicators are adequately briefed; and
- ✧ Conduct checks / audits to confirm procedures are being used in the field.

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(2), (5), (16).**

3.3.4. Protecting Bodies of Water During Pesticide Use

Relevant Regulation Section:

71(5) *A licensee, for the purposes of a pesticide use for which a licence is required, must ensure that a no-treatment zone between an outdoor pesticide use area and a body of water is sufficient to prevent the release of pesticide spray or runoff into the body of water.*

Definitions (Section 1)

"No-treatment zone" *means an area of land that must not be treated with pesticide*

"Body of water" *does not include a human made, self-contained body of or structure for water.*

Reason for this Regulatory Requirement:

A licensee is to determine and use a sufficiently large no treatment zone (buffer zone) between a treatment area and a water body (based on application method and local conditions) to prevent pesticide drift or runoff from reaching the water body, to protect aquatic organisms.

Background Information:

In the IPM Regulations, a body of water includes water in streams, creeks, rivers, lakes, marine waters and wetlands, but does not include water in human made structures containing water with no outflow (e.g., ornamental ponds). Water in a ditch is usually a body of water under the IPM

Regulation definition, because ditches are generally designed to drain and as such, are not self contained. Many water bodies are considered to be important habitat for fish or other aquatic organisms including amphibians, insects and other invertebrates. It is also an offence under the federal *Fisheries Act* to deposit a substance into water that may harm fish or fish habitat and food sources.

A no-treatment zone (NTZ) is an area of land to which pesticide is not directly applied. The NTZ can receive spray drift or runoff, but must be wide enough to intercept spray drift or runoff from reaching the body of water. The NTZ would generally be contained within the property of the person / agency for whom the treatment was conducted. The NTZ is sometimes also called a "buffer zone".

The size of the NTZ required is generally dependent on:

- the application method;
- the potential for runoff; and
- spray drift and influence of wind direction and speed.

Application equipment selection and use affects spray drift. Spray equipment operated at high pressures, such as power hose sprayers (also called handgun or hydraulic sprayers), powered backpack sprayers and air-blast sprayers have a high potential for drift and generally require a large NTZ. Spray equipment operated at lower pressures, such as boom sprayers, hand operated backpack and hand held pressure sprayers have a lower potential for drift and would generally require a smaller NTZ. Equipment used for the treatment of individual tree stems (e.g. for drilling, basal bark, frilling, hacking / squirting, notching, stem injection, stump applications or painting and wipe-on techniques) likely require a very small NTZ, as the pesticide is neither airborne nor applied to the soil. Using low pressures is critical because droplet size increases when the spray pressure decreases for a given nozzle size. Small spray droplets drift more easily than large spray droplets. To minimize drift, a combination of large nozzle and low pressure should be selected that meets the required product application rate.

Other drift reducing technology includes use of drift retardant chemicals, nozzle shrouds and "drift-reduction" nozzles.

Runoff is the flow of pesticide over the ground either at the time of treatment (as spray mix flowing down a slope) or after treatment (such as from rain or irrigation carrying the pesticide down the slope). Runoff occurs when water is applied to the soil at a faster rate than it can enter the soil. Runoff water can carry pesticides in the water itself or bind to eroding soil particles. Factors that influence runoff and that must be considered when determining NTZ width include:

- The slope or grade of an area and vegetation cover;
- The texture, moisture and organic content of the soil;
- The amount and timing of rainfall or irrigation during or following application; and
- Whether the soil was water-saturated or not at the time of application.

Note that it will generally not be acceptable to apply a pesticide spray to the bank of a ditch or creek where there is potential for rain to carry the pesticide into the body of water.

Wind is the primary cause of spray droplets being carried in the air. As wind velocity increases, the potential for spray drift increases. Even if the wind velocity is below the maximum allowed by sections 71(7) of the IPMR for foliar or broadcast spraying outdoors (8 km per hour), drift can occur. The applicator must stop spraying if an NTZ is not adequate to prevent drift into a body of water. As most drift occurs downwind, the size of a NTZ is usually smaller upwind than downwind.

Other factors can also affect drift. High temperatures and low humidity both increase the rate at which airborne spray droplets evaporate. Evaporation decreases pesticide droplet size, resulting in droplets that are more prone to drift. A temperature inversion can also affect drift when the air at ground level is cooler and more stable than air higher above the ground, causing fine spray droplets to remain suspended in the air for a long period, when they are likely to drift off target. The height above ground that a pesticide is applied also affects drift. The lower the nozzle is held (or the height of a spray boom is positioned) the lower the drift potential.

While the use of drift reduction methods is recommended it still may be necessary to determine the NTZ required at a particular site. This may require testing of equipment in similar conditions to observe spray drift. Drift distance may be best observed by using drift measuring cards such as Teejet Water and Oil Sensitive paper. They can be complimented with information available from manufacturers or drift models available through the internet or the pesticide industry spray drift task force.

Some Ways for a Licensee to Address This Requirement:

- ✧ Identify and record NTZs to be used for typical field situations, application equipment and spraying technique to be used. Seek advice from spray technology experts and consider running field tests to measure spray drift;
- ✧ Review and comply with buffer zones (no treatment zones) that may be specified on labels as well as any set backs established by other agencies or local authorities;
- ✧ At each treatment site determine the appropriate NTZ to use based on site conditions such as soil type, slope and weather;
- ✧ Record the NTZ used at each site; and
- ✧ Train applicators on how to decide what NTZ to use for the different application equipment used and different conditions that may be encountered. Include training on the environmental fate properties of pesticide products so they understand the need for NTZs and factors that increase drift and runoff potential.

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(2), (15), (14) (5), (16), (32).**

3.3.5. Protection of Wells, Domestic Water Sources, Irrigation Systems and Agricultural Water Sources

Relevant Regulation Sections:

71(2)(b) *A licensee, for the purposes of a pesticide use for which a licence is required, must ensure that the following precautions are taken in carrying out the pesticide use: precautions to ensure that domestic water sources, agricultural water source [and soil used for agricultural crop production] are protected for their intended use.*

71(3) *Except as provided in subsections (4) and (12) and 79(2), a person described in subsection (1) [a licensee, for the purposes of a pesticide use for which a licence is required] must maintain a 30 m no-treatment zone around a water supply intake or well used for domestic or agricultural purposes, including water used for livestock or for irrigation of crops.*

71(4) *A licensee, for the purposes of a pesticide use for which a licence is required, may reduce the size of the no-treatment zone under subsection (3) if reasonably satisfied that the smaller zone will ensure that pesticide from the use will not enter the water supply intake or well.*

35(1)(l) *A licensee who uses a pesticide must keep a record containing the following information for each treatment location and day of use:*

1) If the licensee decided under Section 71(4) [use requirements – licensee] that a no-treatment zone may be reduced, the information on which the licensee based the decision.

Reason for this Regulatory Requirement:

Clean water is essential for drinking and agricultural use. It must be protected from pesticide contamination. A minimum 30 m NTZ is to be used around wells and intakes, except where the licensee evaluates and documents information that shows a smaller no-treatment zone can be used without pesticide entering the well.

Background Information:

A 30 m no-treatment zone (30 m NTZ) is the distance away from the well or intake within which a pesticide must not be directly applied. The 30 m NTZ may receive some drift or runoff, but this should be minimized.

Protecting Domestic and Agricultural Water Sources and Wells
Contamination of wells and domestic or agricultural water sources during pesticide must be prevented. Precautions should include:

- Ensure that the location of water sources is identified prior to pesticide use and that applicators are aware of the locations and use the appropriate NTZ;
- Apply pesticides under appropriate weather conditions to prevent drift or runoff (e.g. wind less than 8 km/hour and not during heavy rainfall or if heavy rainfall is expected);

- Use only appropriate calibrated application equipment and an appropriate combination of nozzle size / type, pressure and other drift reduction technology to minimize drift;
- Apply pesticides whose solubility, adsorption and leaching potential are appropriate for the type of soil found in the treatment area;
- Apply pesticides only in areas where the soil type and condition are appropriate (e.g. soil is not saturated, and is not porous); and
- Avoid applying pesticides upslope of water sources, especially if the pesticide is residual or the ground is severally sloping.

Reducing the Size of the 30m No-Treatment Zone Around Wells and Water Supply Intakes
Note that the *British Columbia Drinking Water Protection Act* and Regulation contain prohibitions against contaminating drinking water. For example Section 23(1) states that a person must not "introduce anything or cause to allow anything to be introduced into a domestic water system, a drinking water source, a well recharge zone or an area adjacent to a drinking water source." Review this legislation at the following web sites: the Act http://www.qp.gov.bc.ca/statreg/stat/D/01009_01.htm and the Regulation http://www.qp.gov.bc.ca/statreg/reg/D/200_2003.htm

To reduce the 30 m NTZ, it would be necessary to evaluate factors such as well construction, soil properties and slope in the vicinity of a well, the quantity of pesticide to be used and properties of the pesticide (solubility, adsorption, leaching potential), to determine the potential for the pesticide to reach the well or intake.

It is expected that a technical report would be prepared and retained with pesticide use records. This report would present the analysis of factors used to conclude that a smaller specified NTZ could be used at a particular site. It may also be desirable to conduct an analysis of water samples from a water source to test that there was no pesticide contamination, following treatment.

Some Ways for a Licensee to Address This Requirement:

- ✧ Develop practices to protect drinking water from contamination through consultation with local Drinking Water Officers and water suppliers when appropriate;
- ✧ Consult property owners and neighbours and the well registry (http://www.env.gov.bc.ca/wsd/data_searches/wrbc/index.html) to locate wells and water intakes (Licensees are advised that this database may not be complete);
- ✧ Identify and record the location of all wells and water sources prior to pesticide use and ensure all applicators are aware of these locations (e.g. by a map, diagram or written instructions);
- ✧ Ensure that applicators are trained to use the required NTZ; and
- ✧ If a reduced 30 m NTZ is desired, obtain expert advice to evaluate the technical information that must be considered if the reduction is feasible and to prepare a report. If a reduced NTZ is used, retain the report with pesticide use records.

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(2), (3), (4), (5).**

3.3.6. Establishing No-treatment Zone to Prevent the Release of Pesticide Spray or Runoff Onto Adjacent Property Unless Property Owner or Manager Agrees Otherwise

Relevant Regulation Section:

32 *A person who holds a licence … must …. before using a pesticide obtain the express permission of the owner or manager of the land to which the pesticide is applied.*

71(6) *Unless an adjacent property owner or manager agrees otherwise, a person described in subsection (1) must ensure that a no-treatment zone between an outdoor pesticide use area and the adjacent property is sufficient to prevent the release of pesticide spray or runoff onto the adjacent property.*

Reason for this Regulatory Requirement:

Pesticide should not be applied on a property without the owner's or manager's approval. The licensee is to determine and use a sufficiently large no-treatment zone between a treatment area and an adjacent property to prevent pesticide spray (droplets) or runoff from reaching the adjacent property unless there is a prior agreement with the adjacent property owner.

Background Information:

The definition of a no-treatment zone (NTZ) is given in the Explanatory Note titled "Protection of Bodies of Water during Pesticide Use".

In landscape pest management, particularly on small residential properties, it may sometimes be difficult to avoid pesticide release onto neighbouring properties. A primary consideration should be how to minimize drift and runoff so that all pesticide is confined to the target property. Directing all spray away from the adjacent property as well as other drift / runoff reduction methods can be employed. When methods to avoid release onto neighbouring properties are not practical, agreement from the adjacent owner or manager can be requested. Such approval must be obtained prior to treatment. When agreement is required from an adjacent property owner or manager, care in updating this agreement is recommended if there is likelihood of ownership changes and/or re-development / zoning. It is recommended that a record be maintained of the date and person who gave the approval.

The Explanatory Note regarding protecting bodies of water during pesticide use" outlines factors that need to be considered to minimize drift and runoff and to establish a NTZ for particular

sites. Preventing release onto adjacent properties will also require an understanding of the seasonal differences in plant size and canopy density which will need to be considered when near a property boundary. IPM preventative measures such as pruning, removal of boundary plants and plantings of pest resistant varieties can make it easier to meet this regulatory requirement. Differential treatment methods between border and interior plants can also aid in meeting the requirement.

Some Ways for a Licensee to Address This Requirement:

- ✧ Evaluate treatment areas in relation to property boundaries and assess need for NTZs and/or obtaining / updating an agreement from the owner or manager of an adjoining property;
- ✧ Train applicators to recognize changing factors which may lead to modifying no-treatment zones throughout the season, e.g. crop loads on larges fruit trees may cause branches to overhang adjoining properties;
- ✧ Identify and record NTZs to be used for typical field situations, application equipment and spraying technique to be used. Seek advise from spray technology experts and consider performing small-scale verification trials to validate drift potential application equipment under typical operating conditions (e.g. early / late season canopy densities); and
- ✧ Train applicators to monitor wind direction and speed and to recognize conditions that favour inversions that may cause drift when speeds are very low. Training should include how to modify NTZs for different application equipment when wind changes direction.

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(2), (3), (4), (5), (32).**

3.3.7. Precautions to Prevent Unprotected Human Exposure to Pesticide

Relevant Regulation Section:

71(2)(a) *A licensee, for the purposes of a pesticide use for which a licence is required, must ensure that the following precautions are taken in carrying out the pesticide use: precautions to prevent unprotected human exposure to pesticide.*

Reason for this Regulatory Requirement:

Licensees should evaluate whether there is a risk that bystanders may be in or adjacent to the treatment area during pesticide use or whether bystanders could be exposed to a pesticide by contacting treated surfaces. If necessary, licensees should identify and implement measures to prevent bystander exposure.

Background Information:

Possible Causes of Bystander Exposure to Pesticide

Bystander exposure to pesticides may occur as a result of the following:

- Applicators not being aware of the treatment area boundaries, resulting in pesticides being applied in locations that people are not informed of;
- Inadequate posting of notices to identify the treatment area;
- Insufficient information on treatment notices;
- Inadequate communication with clients, residents or neighbours about timing and location of treatments, especially in cases where no posted notice is required (e.g., single residence properties);
- Drift to areas where people are present;
- Applicators not adequately trained to recognize activities or objects around which there should be an NTZ.

Possible procedures to prevent exposure of unprotected bystanders include the following:

- Ensuring at the beginning of each pest management season that multi-year clients want service to continue;
- Ensuring that the location of the treatment area boundary is confirmed during the pre-treatment inspection, that all applicators are aware of its location, and that pesticide use is kept within the treatment area;
- Ensuring that posted treatment notices are sufficiently large and are set up in high visibility locations where they can be seen by anyone approaching the treatment area;
- Ensuring that the treatment notices and/or communications with clients, residents and neighbours, include appropriate information. This may include:
  - Timing of proposed treatment and any changes to that timing,
  - Closing all windows and doors,
  - Turning off air conditioners,
  - Covering swimming pools and wading pools,
  - Bringing inside children's toys, barbecues, lawn furniture and clothes off of clothes lines,
  - Keeping away from the treatment area during pesticide use and for a specified time after it is completed,
  - Not eating garden produce for a specified period after spraying has been completed, and then to wash them thoroughly before consumption,
  - Avoid touching or walking on treated surfaces,
  - Wearing footwear on treated surfaces for specified times after treatment.

- Recognizing treatment situations where spotters, guards or barricades (tape) may be essential to keep bystanders away from a treatment site;
- Applying pesticides during periods of lowest public activity (e.g. during weekends for school grounds or in the early morning for parks along roadsides before or after children have walked to school);

- Establishing and using the required no-treatment zones to prevent drift to areas where people may be present, such as children playing, joggers, people walking dogs, commuters, delivery people, gatherings at parks or other public areas;
- Using appropriate application equipment to minimize drift (e.g. using a wick applicator to apply a herbicide close to fence lines);
- Applying pesticides only when the wind direction is away from areas where people may be present;
- Training applicators to recognize activities or objects in or near the treatment area around which there should be an NTZ (e.g. children's toys, barbecues, open windows, drying clothes or hammocks);
- Laying tarps where no spray droplets should land (e.g. gardens or patios on adjacent properties).

Some Ways for a Licensee to Address this Requirement:

- ✧ Develop procedures and appropriate information for posting treatment notices and communicating with clients, residents or neighbours who may need to take precautions to avoid exposure;
- ✧ Develop procedures and train applicators to ensure that treatment boundaries are confirmed, to identify when NTZs are required, to minimize drift and to modify or stop application in situations that may result in bystander exposure to pesticides;
- ✧ Use spotters when appropriate to assist in making decision to stop and resume treatment; and
- ✧ Develop company / agency procedures for internal audits of compliance with this IPMR requirement.

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(2), (3), (5) (4), (6), (7), (8).**

3.3.8. Recording Prevailing Meteorological Conditions During Pesticide Use

Relevant Regulation Sections:

35 (1)(i) *A licensee who uses a pesticide, other than a wood preservative pesticide, must keep a record containing the following information for each treatment location and day of use:*

(i) If the use was outdoors, the prevailing meteorological conditions including temperature, precipitation and velocity and direction of the wind.

Reason for this Regulatory Requirement:

Weather conditions are critical factors that can contribute to pest treatment effectiveness and off-target movement of pesticides. The need to keep records helps to ensure applicators consider weather conditions before and during treatments and the records can be used to assess the importance of weather when treatment effectiveness is evaluated. They can also be used to demonstrate compliance with regulatory, label and safety requirements concerning field decisions to start, continue or stop spraying.

Background Information:

Recording prevailing meteorological conditions at each treatment location ensures applicators have assessed whether weather conditions are within required ranges specified on product labels and/or spraying can be done to meet the following IPMA regulation sections requirements:

- Establishing adequate no-treatment zones adjacent to bodies of water and adjacent property – for weather and other conditions on site (s. 71 (5 and 6));
- No broadcast spraying or foliar spraying outdoors if wind speeds are greater than 8 km/hr (s. 71(7);
- Not using residual pesticides when heavy rain is falling or imminent (s. 71(9)); and
- Not spraying a pesticide on foliage if water is flowing on it (s. 71(9)).

Some Ways for a Licensee to Address this Requirement:

- ✧ Establish the form to be used for these records. A model "Pesticide Use Record" form that allows for recording of weather is posted on the B.C. Government IPM Program website and can be printed and used, but the licensee may develop a modified record keeping system (See the Pesticide Use Record Form at the following address: http://www.env.gov.bc.ca/epd/epdpa/ipmp/forms1.html ;
- ✧ Ensure that records of weather conditions are kept up-to-date and available for inspection.

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(2), (3), (4), (32).**

3.3.9. Broadcast Spraying or Foliar Spraying Outdoors is Restricted to Wind Speeds Less than 8 km/hour

Relevant Regulation Section:

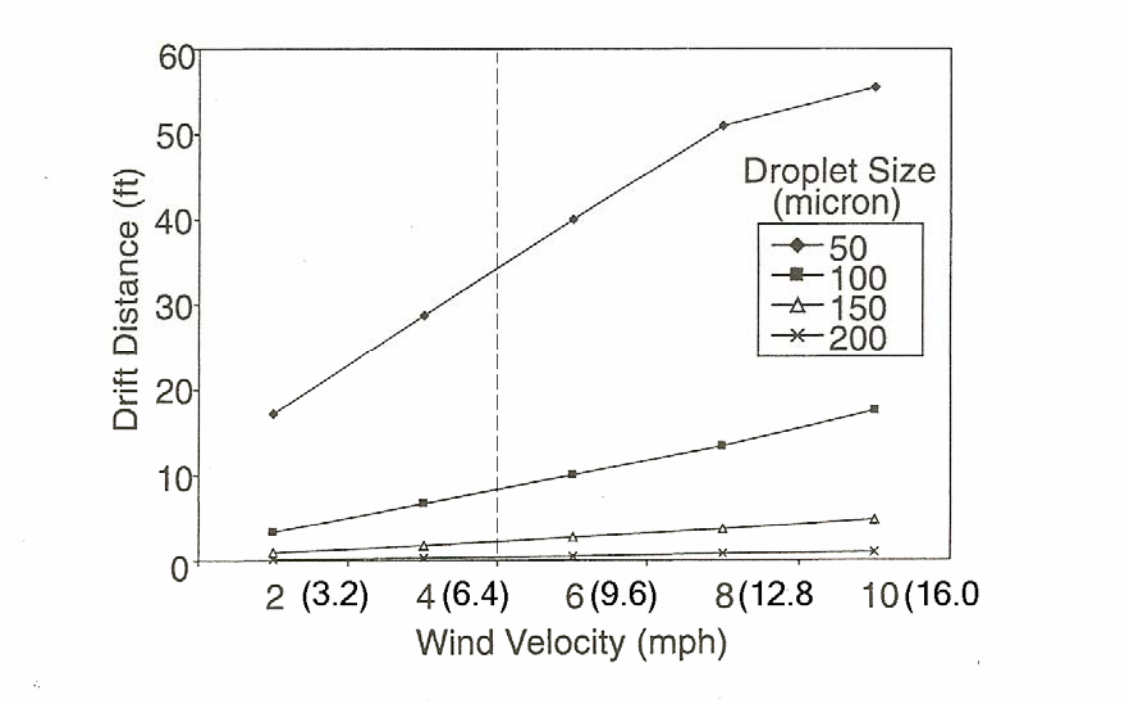
71(7) *Except as provided in section 76(3) [use requirements – railway vegetation management], a person described in subsection (1) must not engage in broadcast spraying or foliar spraying outdoors if the wind speed exceeds 8 km an hour.*

Reason for this Regulatory Requirement:

The intent is to minimize the wind-borne movement of spray droplets away from the target.

Background Information:

High wind conditions are likely to result in drift. Licensees in the landscape sector are typically faced with decisions to continue or stop spraying as wind speeds approach 8 km/hr. The following figure is generated from computer simulation models examining the effect of major variables (e.g. wind velocity) on drift distance of spray droplets from ground boom sprayers (see reference 32 in Appendix 1) that are not shrouded.



Effects of wind velocity and droplet diameter on drift distances of water droplets directed downward at 65ft/second toward a target 18 inches (45 cm) below discharge point. (Numbers in brackets on x axis are wind speeds in km/hr.)

The wind speed can be measured as a matter of practice but a number of visual systems can be used to estimate low wind speeds. For example, leaves and grasses moving gently generally means wind speeds are less than 3 km/hr. When wind can be felt on the face, small branches move, leaves move rapidly and tall grasses sway, wind speed needs to be measured.

Wind speed is often variable and is affected by such factors as the proximity of buildings, water bodies, hills, nearby vegetation and height above the ground. It may be necessary, therefore to measure the wind speed a number of times at the site of pesticide application and not to rely on Environment Canada reports for the region.

Some Ways for a Licensee to Address this Requirement:

- ✧ Have on site and use a wind guage (anemometer) to measure wind speed at appropriate intervals if wind speed is approaching the legal limit (8 km/hr); and
- ✧ Ensure each applicator is trained on the factors to consider and use of the wind guage to ensure compliance with the maximum wind speed requirement.

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(2), (3), (4), (31), (32).**

3.3.10. Use of Slug Baits

Relevant Regulation Section:

71(11) *A licensee, for the purposes of a pesticide use for which a licence is required, must use slug bait that may be harmful to children or domestic animals only in slug bait stations that are resistant to tampering by children and animals, or in areas that are inaccessible to children and domestic animals.*

Reason for this Regulatory Requirement:

The intent is to prevent children or domestic animals (cats and dogs) from harmful consumption of slug baits containing metaldehyde.

Background Information:

Slug baits containing the active ingredient metaldehyde (especially pelleted metaldehyde) are toxic to children and domestic animals. They must be deployed only in areas that are inaccessible to children and domestic animals.

Where appropriate, use of metaldehyde can be replaced by the less hazardous product containing ferric phosphate. Otherwise slug bait with metaldehyde must be placed in areas that are inaccessible to children and domestic animals. Possible locations include:

- Locked areas such as greenhouses or walled gardens with gates;
- Narrow recesses between buildings where children and domestic animals cannot gain access;
- Under heavy boards or rocks that domestic animals and children cannot move; and
- Areas that are off limits to children and where adult supervision are maintained.

Some Ways for a Licensee to Meet this Requirement:

- ✧ Use ferric phosphate; and/or
- ✧ Develop a list of and only apply metaldehyde in acceptable locations .

Additional Sources of Information:

Further information may be obtained from the following numbered references, found at the end of the Explanatory Notes for this sector in Appendix 1: **(7), (8), (9)**

APPENDIX 1: List of Additional Resources and References for Landscape Pest Managers

(1) **Sectoral Review Paper for Landscape/Structural**. Ministry of Environment, February, 2006. Available at the following web site:

http://www.env.gov.bc.ca/epd/epdpa/ipmp/pesticide_pdfs/landscape_review.pdf

(2) Adams, R.W. **Handbook for Pesticide Applicators and Dispensers**. B.C. Ministry of Environment. 2005.

(3) **Standard Practices for Pesticide Applicators**. Workers' Compensation Board of B.C. 1988.

(4) **Health Canada, Pest Management Regulatory Agency**. Web site for pesticide label searches:

http://www.eddenet.pmra-arla.gc.ca/4.0/4.0.asp

(5) **The National Pesticides Call-line** (operated by Health Canada) can provide technical information on pesticides registered in Canada by using 1 800 267-6315.

(6) **Agrichemical Warehousing Standards Association**. Web site for standards for storage of Commercial pesticides used in crop protection:

www.AWSACanada.com

(7) **Home and Garden Pest Management Guide for British Columbia**. B.C. Ministry of Agriculture, Fisheries and Food. 2000.

(8) Gilkeson, L.A. and R.W. Adams. **Integrated Pest Management Manual for Landscape Pests in British Columbia.** B.C. Ministry of Environment, Lands and Parks. 2001. Available at the following web site:

http://www.env.gov.bc.ca/epd/epdpa/eripm/landshtm/Content.htm

(9) Olkowski, W.S., S. Daar and H. Olkowski. 1991. **Common Sense Pest Control**. The Taunton Press, Newtown, CT.

(10) Pirone, Pascal. 1978. **Diseases and Pests of Ornamental Plants**. John Wilie and Sons, New York.

(11) **Tree Fruit Production Guide**. B.C. Ministry of Agriculture and Lands.

(12) **Landscape and Nursery Production Guide**. B.C. Ministry of Agriculture and Lands.

(13) **Floriculture Production Guide**. B.C. Ministry of Agriculture and Lands.

(14) Soil Survey Manual, Handbook # 18. 1993. US Department of Agriculture.

(15) Field Book for Describing and Sampling Soils. 2002. National Resources Conservation Service, US Department of Agriculture.

(16) Pesticide Application Equipment, Sprayer Calibration Worksheets. B.C. Ministry of Agriculture and Lands. Available from the following web site:

http://www.agf.gov.bc.ca/pesticides/f_6.htm

(17) Weeds BC. B.C. Ministry of Agriculture and Lands. Available at the following web site:

http://www.weedsbc.ca

(18) Weed Management. B.C. Ministry of Agriculture and Lands. Available at the following web site:

http://www.agf.gov.bc.ca/cropprot/weeds.htm

(19) Field Guide to Noxious and other Selected Weeds of B.C. B.C. Ministry of Agriculture and Lands. Available at the following web site:

http://www.agf.gov.bc.ca/cropprot/weedguid/weedguid.htm

(19) Powell, G.W. et al. 1994.**Field Guide to the Biological Control of Weeds in B.C**. B.C.Ministry of Forests.

(20) Invasive Plant Council of B.C. Available from the following web site:
http://www.invasiveplantcouncilbc.ca

(21) West Coast Gardening: Natural Insect, Weed and Disease Control. Linda A. Gilkenson, Ph.D. 2006. Trafford Publishing, Victoria B.C. fax: 250 383-6804; orders@trafford.com.

(22) Organic Tree Fruit Management 1998. Linda Edwards. Certified Organic Associations of British Columbia. 240 pp. Covers organic pest and disease management, information on soil fertility and nutrition in tree fruits, management tools available to the organic grower. $40 plus shipping. Available from: COABC, Box 577, Keremeos, B.C. Canada V0H 1T0. Web: http://www.certifiedorganic.bc.ca/

(23) A Resident's Guide to Natural Yard Care for the Lower Mainland. 2005. Greater Vancouver Regional District 32 pp. Yard and lawn care advice tailored to coastal lawns. Available from the GVRD, 4330 Kingsway, Burnaby, BC V5H 4G8. Phone 604-432-6200. E-mail: icentre@gvrd.bc.ca Web: http://www.gvrd.bc.ca

(24) Ecologically Sound Lawn Care for the Pacific Northwest: Findings from the Scientific Literature and Recommendations from Turf Professionals. 1999. David K. MacDonald. Seattle Public Utilities. 89 pp. Available on-line by following links to Natural Lawn Care on:

http://www.ci.seattle.wa.us/util/Services/Yard/Natural_Lawn_&_Garden_Care/index.asp

(25) Master Gardeners of British Columbia. Plant information Line. Call 604-257-8662 on Mondays and Wednesdays from 13:30 to 3:00 pm. This is a non-profit association based at VanDusen Botanical Garden Vancouver, with members all over the south coast and Vancouver Island. They share their knowledge and help with pest identification in public clinics held at garden centres, nurseries and gardening events.

http://www.bcmastergardeners.org/

(26) University of British Columbia Botanical Garden. http://www.ubcbotanicalgarden.org/ The garden in Vancouver provides two ways of asking gardening questions: Hotline: Call 604 822-5858 on Tuesdays and Wednesday s from 12:00 to 3:00 pm. Online Discussion Forums: Ask questions on-line by visiting:

http://www.ubcbotanicalgarden.org/forums/

(27) Evergro Westgro: A full line of biological control agents available through on-line catalogue. Aphid midges, the spider mite predatory mite (*Persimilis)*, insect parasitic nematodes and other biological controls available in consumer sizes for a home garden or greenhouse; also sticky traps, monitoring equipment and many other horticultural supplies. Shipping offices in Delta, Abbotsford, Vancouver, Victoria and other B.C. locations. Head sales desk (Delta): Toll free: 800 663-2552 Fax: 604 940-0258 Web: http://www.growercentral.com/

(28) The Bug Factory: Home gardener packages for *Cryptolaemus* lady beetles, insect parasitic nematodes, the spider mite predator (*Persimilis)* and other species. Contact company for current prices and shipping availability. 1636 East Island Highway, Nanoose Bay, BC V9P 9A5. Phone 250 468-7912. Fax: 250 468-9484 E-Mail: info@thebugfactor.ca Web: http://www.thebugfactory.ca/

(29) Finch, Kelly. **Field guide to pests of managed forests in British Columbia.** Joint Publication of Forestry Canada and B.C. Ministry of Forests, DSS Cat. No. Fo29-14/16E. No. 16. 188 pages.

(30) A number of B.C. University Colleges offer **Horticulture programs with an emphasis on pest management.** Contact Fraser Valley University College, Langara and Three Rivers for further information.

(31) Orchard Spray Drift Management. Farm Mechanization Fact Sheet. B.C. Ministry of Agriculture. Feb. 2003. Order No. 234.006-2.

(32) Ozkan, H., Effect of major variables on drift distances of spray droplets. Ohio State University Fact sheet AEX 525-98 in Proceedings of the International Conference on Pesticide Application for Drift Management. October 27-29, 2004. Washington State University Extension (ramsay@wsv.edu).

(33) Higley, L. and Pedigo, L. 1996 **Economic Thresholds for Integrated Pest Management.** University Nebraska Press. 327pp.

(34) B.C. Landscape and Nursery Association, # 102 5783- 176A Street, Surrey, B.C. V3S 6S6 (Telephone: 604-574-7772).

(35) British Columbia Landscape Standard, Sixth Edition, 116 pages (available from B.C. Landscape and Nursery Association).