

RE: Creative Sentencing agreement for Orkin Canada.

These projects were completed ahead of schedule. All scheduled payments have been made to the contractor.

STRUCTURAL AND FUMIGATION EXAMS		
Project Description and Milestones	MILESTONE 1	
	1.1. Lakeland College (LC) will finalize a contract with Vivianne Servant (Contractor), expert in pesticide training and certification. Contract will outline expectations of work, milestones and fees to be dispersed.	Contract was finalized January 25, 2023. Vivianne was sent an outline of expectations at that time.
	1.2. Contractor agrees to commence work within 15 days of being awarded the contract.	Vivianne began immediately.
	1.3. EPA will ensure that LC provides EPA Environmental Investigations Liaison with notice once the contract has been awarded identifying the contractor and the start date of the contract.	Completed, all details shared for contract finalization.
	MILESTONE 2	
	2.1. LC will provide the National Structural Manual, BKR's and existing exam bank to the contractor in a standardized format from which the contractor would develop structural examination questions in the standardized format provided.	This information was provided to Vivianne immediately after the contract was finalized.
	2.2. Contractor reviews and updates the current certification structural exam (52 questions/exam Bank). Contractor establishes secondary exam which includes 20 new questions from the structural manual.	Vivianne provided 60 questions for a new Structural exam and 60 questions for a new Structural Supplemental exam to Lakeland/EPA on April 26, 2023.
	2.3. LC and EPA review updated exam bank and exam, provide comment to Contractor. Contractor makes required changes.	Exam questions have been finalized.
	2.4. Once work is acceptable to LC and EPA, Milestone 2 will have been completed.	Completed May 31, 2023
	2.5. EPA will ensure that LC provides notice to EPA Environmental Investigations Liaison that Milestone 2 has been completed and funds dispersed.	Completed, funds released
	MILESTONE 3	
	3.1. LC will provide the National Fumigation Manual, BKR's and existing exam bank to the contractor in a standardized format from which the contractor would develop fumigation examination questions in the standardized format provided.	Provided to Vivianne June 8, 2023
	3.2. Contractor reviews and updates the current certification fumigation exam (52 questions/exam bank). Contractor establishes secondary exam which includes 20 new questions from the fumigation manual.	Provided to Lakeland July 17, 2023
	3.3. LC and EPA review updated exam bank and exam, provide comment to Contractor. Contractor makes required changes.	Exam questions have been finalized
	3.4. Once work is acceptable to LC and EPA, Milestone 3 will have been completed.	Completed July 31, 2023
	3.5. EPA will ensure that LC provides notice to EPA Environmental Investigations Liaison that Milestone 3 has been completed and funds dispersed.	Completed, funds released

APPLICATOR CORE UPDATES		
Project Description and Milestones	MILESTONE 1	
	1.1. Lakeland College (LC) will finalize a contract with Vivianne Servant (Contractor), expert in pesticide training and certification. Contract will outline expectations of work, milestones and fees to be dispersed.	Agreement was finalized August 31, 2023. Contract was finalized December 7, 2023
	1.2. Contractor agrees to commence work within 15 days of being awarded the contract.	Vivianne began immediately.
	1.3. EPA will ensure that LC provides EPA Environmental Investigations Liaison with notice once the contract has been awarded identifying the contractor and the start date of the contract.	Completed, all details shared for contract finalization.
	MILESTONE 2	
	2.1. LC will provide the Applicator Core BKR's to the contractor in a standardized format from which the contractor would develop structural examination questions in the standardized format provided.	This information was provided to Vivianne immediately after the verbal agreement.
	2.2. Prior to initiating work on the manual, the contractor would provide the following information to LC for review and approval: 2.2.1 Develop a list of suggested updates to the manual. 2.2.2 Once the above information is approved, the contractor will initiate development of the manual using a layout provided to them by Lakeland College that has the National Applicator Core BKR's incorporated into it. 2.2.3 Endure that all pesticides registered for control of pests identified in 2.2.1 are included in the training materials. 2.2.4 Ensure accuracy and relevance of all human health and safety information that an applicant would need to know to conduct a safe pesticide application (for both themselves and the public). 2.2.5. Develop information including all the appropriate application equipment and methods of application to meet the pesticide label requirements 2.2.6. Develop information on how to handle emergencies associated with general pesticide applications (e.g., spills, health effects, vandalism, theft etc.) 2.2.7. Develop information on how to conduct a professional pest management application.	Completed.
	2.3. Once the contractor has completed the first draft, they would submit it to LC and EPA for review and comment.	Vivianne provided the BKR's to LC and EPA on September 6, 2023.
	2.4. Once work is acceptable to LC and EPA, Milestone 2 will have been completed.	Completed September 6, 2023
	2.5. EPA will ensure that LC provides notice to EPA Environmental Investigations Liaison that Milestone 2 has been completed and funds dispersed.	Completed, funds released
	MILESTONE 3	
	3.1. LC will forward the first draft to the Subcommittee for review and comment	Sent September 7, 2023
	3.2. Based on comments received, the contractor will provide additional information and update the manual and provide it to LC.	N/A
	3.3. LC and EPA will review the manual and ensure all the recommendations of the Subcommittee have been incorporated.	Completed October 18, 2023
	3.4. LC will provide a copy of the updated draft to the Subcommittee to approve the changes made by the contractor.	Completed December 19, 2023
	3.5. Contractor will forward to LC suggested changes to national core BKR's based on research used for the manual.	Completed
	3.6. LC will forward the suggested changes to the BKR's provided by the contractor to the Subcommittee for review and approval. The contractor may be requested to address concerns directly with the Subcommittee.	Completed
	3.7. Once the Subcommittee approves the final draft of the manual and the recommended updates to the BKR's, Milestone 3 has been completed.	Completed

3.8. The Subcommittee will forward the completed and endorsed manual to all provinces for use in their respective provinces as the National Applicator Core Training Manual and Milestone 3 will have been completed.	Completed
3.9. EPA will ensure that LC provides EPA Environmental Investigations Liaison that Milestone 3 has been completed and funds dispersed to the contractor.	Completed, funds released.
MILESTONE 4	
4.1. Contractor to develop 100 question examination based on approved manual.	Completed
4.2. LC and EPA will review the examination to ensure examination standard is met and pertinent questions have been incorporated.	Completed
4.3. Contractor to make any requested updates or changes regarding 4.2 review. Final examination to be sent to LC and EPA and Milestone 4 will have been completed.	Completed
4.4. AEP will ensure that LC provides a full accounting of the costs and outlays to AEP Environmental Investigations Liaison to complete the contract and be authorized to receive the remaining funds from the Special Fund.	Completed

Financial statement - October 30, 2024

INCOME

Creative Sentencing award 27,000.00

EXPENSES

Payment to contractor for Structural/Fumigation exam milestone 2	2,299.80	
Payment to contractor for Structural/Fumigation exam milestone 3	2,299.79	
Payment to contractor for Applicator Core milestone 2	9,999.10	
Payment to contractor for Applicator Core milestone 3	4,999.55	
Payment to contractor for Applicator Core milestone 3	999.91	
Payment to contractor for Applicator Core milestone 4	4,399.61	
Lakeland College admin expenses	2,000.00	
TOTAL		24,997.75

REMAINING AWARD 2.25

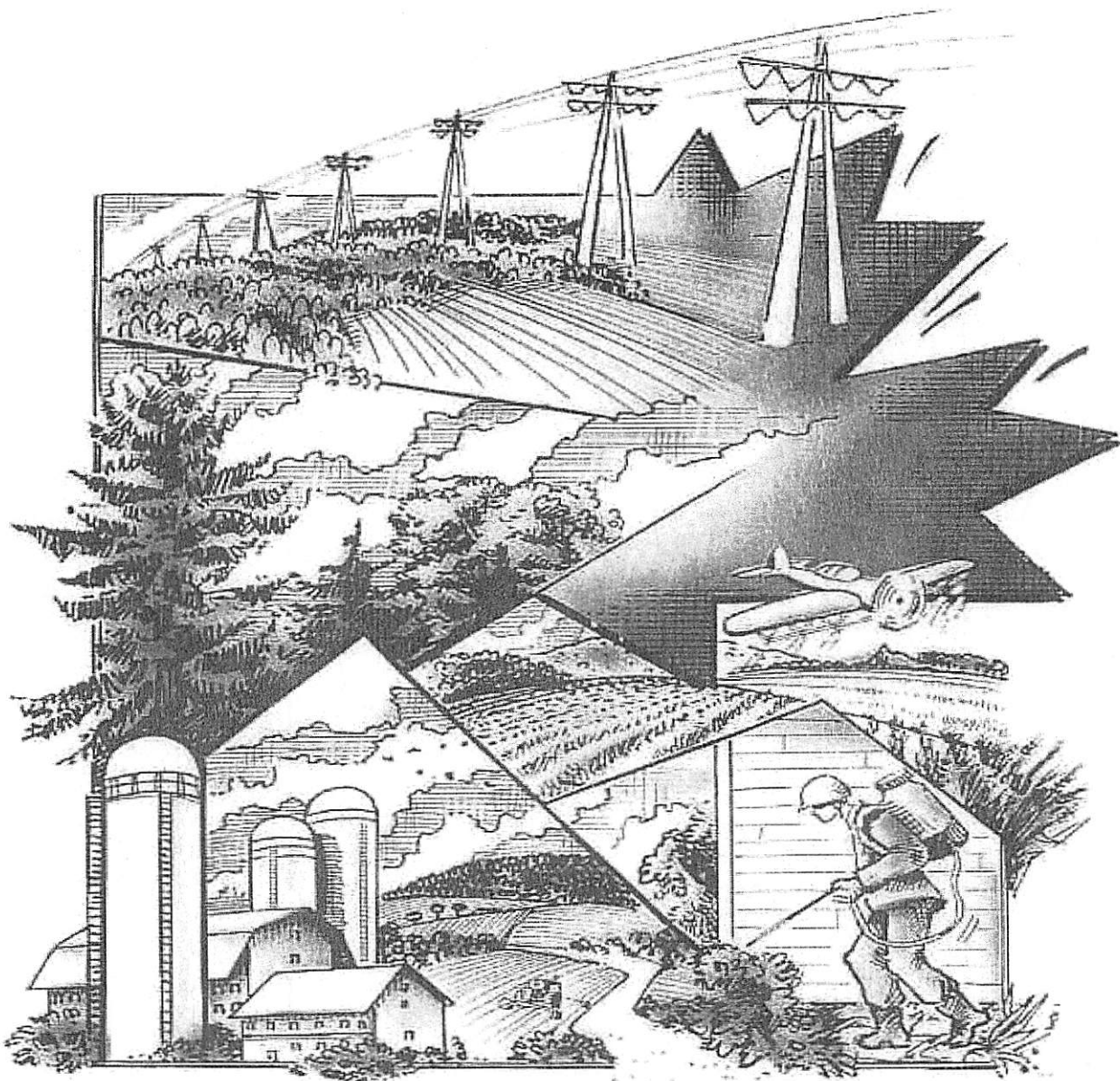
Thank you,



Coordinator, Pesticide Certificate and Business Development
Lakeland College

Canadian Pesticide Education Program

Fumigation Manual



Alberta 2023 Edition

L
Lakeland
COLLEGE

Alberta ■

Acknowledgements

Contributors to the Canadian Pesticide Education Program

FUMIGATION MANUAL

The content and information of the Fumigation Manual complies with the National Standard Pesticide Education, Training and Certification in Canada – Fumigation Module, Basic Knowledge Requirements (BKR) for Pesticide Education in Canada. The BKR information is the minimum information that all Provinces in Canada have agreed is the minimum information that must be included in all provincial fumigation manuals.

The Fumigation Module BKR 1995 Edition was originally written by Dr. D.L. Waugh, Chemical Safety Training Association, Windsor Junction, NS with assistance from the following people:

- Members of the National Task Force on Pesticide Education, Training and Certification (now the Standing Subcommittee on Pesticide Education, Training and Certification (PETC))
- Canadian Pest Control Association, CPCA Technical Group
- Z. Siddiqi, Ontario Pest Control Association
- G. Cutten, Ontario Ministry of Environment and Energy
- B. Menard, Abell Pest Control, Etobicoke, Ontario
- K. Jamieson, Scientific Editor, Forest Pest Management Institute, Sault Ste. Marie, Ontario
- S. Shields, Saskatchewan Institute of Applied Science and Technology, Saskatchewan
- L. Lemieux, Health Canada

The Fumigation Manual was written in 2020 by Vivianne Servant, (retired) Pesticide Certification Specialist, Alberta Environment and Protected Areas and former Co-chair of the Federal, Provincial, Territorial Committee on Pest Management and Pesticides, Standing Subcommittee on Pesticide Education, Training and Certification in Canada.

The manual was reviewed and edited by Susanne Tilley, Newfoundland and Labrador Ministry of Environment and Wildlife (Fumigation Manual and BKR Update Lead) and the Standing Subcommittee on Pesticide Education, Training and Certification in Canada (PETC).

The PETC gratefully acknowledges review, comments and endorsement by the Canadian Pest Management Association.

The information provided in the Fumigation Manual is in addition to the knowledge requirements detailed in the Core Manual, common to all pesticide applicator license/certification categories. Together, the Core Manual and the Fumigation Manual contain information that is relevant to the fumigation certification examination.

Legal Notice

This publication has been prepared for the Federal, Provincial, Territorial Committee on Pest Management and Pesticides, Standing Committee on Pesticide Education, Training and Certification in Canada (PETC) for educational purposes only. While every effort has been made to ensure the accuracy of the information contained in this publication, it should not be construed as legal or professional advice. For information on the use of pesticides for specific pest management problems, users may consult pest management guides available from numerous sources including:

- pesticide manufacturers
- educational resources
- university specialists
- Internet sites.

The PETC makes no representation or warranty of any kind (express, implied or statutory) in relation to this publication or its content, and assumes no responsibility or liability whatsoever arising from, or in any way connected with, the use of this publication or its content.

No endorsement of any third-party products or services is expressed or implied by any information, material or content referred to, or included in this publication.

This publication has been produced in accordance with the requirements of the CanCopy license.

Every effort has been made to provide proper acknowledgment of the original source of information and to comply with copyright law. If information is identified where this has not been done, please notify the Standing Subcommittee on Pesticide Education, Training and Certification in Canada.

Canadian Pesticide Education Program

Fumigation Manual

Contents

Chapter 1 General Information	1-1
Introduction	1-1
Purpose of this Manual	1-1
Use of the Manual	1-2
Practical Experience	1-2
Alberta Regulated Fumigation Definitions	1-2
Advantages and Disadvantages to Fumigation	1-3
Fumigant Grouping.....	1-4
Target Pest	1-4
Inherent Properties.....	1-5
Mode of Action.....	1-6
Definitions.....	1-6
Fumigant Formulations	1-7
General Characteristics of Fumigants	1-7
Fumigant Properties	1-8
Desirable Characteristics of Fumigant Gases	1-8
Fumigant Gas Uses.....	1-8
Physical and Chemical Properties of Fumigants	1-9
Boiling Point	1-9
Latent Heat of Vaporization	1-10
Law of Diffusion.....	1-10
Specific Gravity and Distribution	1-10
Sorption	1-11
Desorption.....	1-12
Chemical Reactions Causing Residue Formation	1-12
Non-Target Effects or Undesirable Effects on the Target Pest by Fumigants	1-13
Fumigant Effects on Non-Target Species.....	1-13
Fumigant Effects on Seed Germination and Growth	1-13
Fumigant Effects on Infesting Pests	1-13
Physical and Chemical Effects on Non-living Materials	1-14
Adverse Effects of Methyl Bromide on Miscellaneous Materials	1-14
Adverse Effects of Phosphine on Miscellaneous Materials	1-15
Adverse Effects of Carbon Dioxide on Miscellaneous Materials.....	1-15
Adverse Effects of Sulfuryl Fluoride on Miscellaneous Materials	1-16
Adverse Effects of Ethylene Oxide on Miscellaneous Products	1-16

Residual Fumigant after Aeration	1-16
<i>Type of Fumigant</i>	<i>1-17</i>
<i>Type of Commodity</i>	<i>1-17</i>
<i>Concentration and Exposure Time</i>	<i>1-17</i>
<i>Moisture Content and Humidity.....</i>	<i>1-17</i>
<i>Temperature.....</i>	<i>1-17</i>
Mode of Action of Fumigants	1-18
<i>Methyl Bromide.....</i>	<i>1-18</i>
<i>Phosphine</i>	<i>1-19</i>
<i>Carbon Dioxide</i>	<i>1-19</i>
<i>Sulfuryl Fluoride.....</i>	<i>1-19</i>
<i>Ethylene Oxide.....</i>	<i>1-19</i>
Physical Properties of Fumigants.....	1-20
Chemical Resistance Management Groups	1-22
Reduced-Risk Pesticides	1-22
Chemical Additives	1-22
Activity 1.0 Comprehension Check:	1-23
Activity 1.0 – Answer Key	1-26
Chapter 2 Labelling	2-1
Fumigant Label Specified Statements	2-3
Label Specified Respiratory Protection	2-5
Label Specified Actions After Incident or Theft of Fumigant	2-5
Other label Information.....	2-6
Activity 2.0 Comprehension Check:	2-7
Activity 2.0 – Answer Key	2-9
Chapter 3 Regulations	3-1
Federal Regulations Pertaining to Fumigations.....	3-2
<i>Transportation of Dangerous Goods Act.....</i>	3-2
<i>Responsibilities When Transporting Dangerous Goods.....</i>	<i>3-3</i>
<i>Reporting Requirements.....</i>	<i>3-4</i>
<i>Emergency Response Services</i>	<i>3-5</i>
<i>Railway Safety Act.....</i>	3-5
<i>Canada Shipping Act.....</i>	3-6
<i>Basic Regulatory Requirement for Fumigations in and Around Vessels.....</i>	<i>3-6</i>
<i>Requirements for Loading Containers Being Fumigated.....</i>	<i>3-7</i>
<i>Requirements for Fumigating Ship's Holds or Containers On-board a Vessel.....</i>	<i>3-7</i>
<i>Requirements for Vessels with Holds or Containers Being Fumigated When Entering a Canadian Port</i>	<i>3-8</i>
<i>Food and Drugs Act</i>	3-8
Provincial Regulations	3-8
Alberta Provincial Regulations.....	3-9
<i>Pesticide Sales, Handling, Use and Application Regulation (PSHUAR).....</i>	<i>3-9</i>
<i>Environmental Code of Practice for Pesticides (ECOPP).....</i>	<i>3-9</i>
Activity 3.0 Comprehension Check:	3-11
Activity 3.0 – Answer Key	3-14

Chapter 4 Human Health	4-1
Medical Fitness	4-2
Respiratory Protection and Stop Work Triggers	4-2
Human Health Concerns When Controlling Pests	4-3
<i>Hantavirus pulmonary syndrome (HPS)</i>	4-3
Activity 4.0 Comprehension Check:	4-5
Activity 4.0 – Answer Key	4-6
Chapter 5 Pesticide Safety	5-2
Threshold Limits	5-3
Routes of Entry	5-4
Training and Certification	5-4
Pesticide Applicator Assistants	5-4
Annual Mandatory Training	5-5
General Safety Procedures	5-5
Preparation	5-6
Fumigation Management Plan (FMP)	5-6
Application	5-10
Security	5-12
Post-treatment	5-14
Restrictions for Workers Entering Treated Areas	5-14
Personal Protective Equipment (PPE)	5-14
Self-Contained Breathing Apparatus (SCBA)	5-15
Airline Supplied Breathing Apparatus	5-15
Safety Check for Breathing Apparatus	5-16
Storage and Cleaning	5-17
Body Protection	5-17
Fumigant Detection Devices	5-17
Glass Colourimetric Detector Tubes	5-19
Halide Leak Detector	5-19
Infra-red Analyzer	5-20
Thermal Conductivity Meter (Fumiscope)	5-21
Portable Gas Chromatograph	5-21
Photoionization Detectors (Organic Vapour Metre)	5-22
Detection Monitors	5-22
Activity 5.0 Comprehension Check:	5-26
Activity 5.0 – Answer Key	5-29

Chapter 6 Pest Management.....	6-1
Integrated Pesticide Management for Space Fumigation	6-2
Preparing to Implement an IPM Program	6-2
Developing an IPM program	6-2
Integrated Pest Management Plan	6-3
Food Storage and Commodity Pests	6-4
Insects and Mites	6-4
<i>Insect Anatomy.....</i>	6-4
<i>Mite Anatomy</i>	6-5
<i>Insect and Mite Life Cycles</i>	6-5
Stored Product Pest Grouping	6-8
<i>Beetles and Weevils (Coleoptera).....</i>	6-10
<i>Moths (Lepidoptera).....</i>	6-11
<i>Booklice (Psocids)</i>	6-12
<i>Mites (Acari)</i>	6-12
<i>Silverfish and Firebrats (Thysanura).....</i>	6-13
<i>Cockroaches (Blattodea)</i>	6-13
Pest Management Methods for Insects and Mites	6-14
Prevention	6-14
Identification	6-16
Monitoring	6-45
Injury and Action Thresholds	6-54
Treatments.....	6-55
Evaluation	6-56
Factors Influencing Fumigant Effectiveness	6-57
Activity 6.1 Comprehension Check:	6-60
Slugs and Snails (Molluscs)	6-64
<i>Life Cycle of Slugs and Snails</i>	6-64
<i>Pest Management Methods for Slugs and Snails.....</i>	6-65
Micro-organisms	6-66
<i>Pest Management Methods for Micro-organisms</i>	6-67
<i>Bacteria</i>	6-67
<i>Fungi.....</i>	6-68
Rodents	6-71
<i>Pest Behaviour and Biology.....</i>	6-71
<i>Pest Management Methods for Rodent Pests.....</i>	6-71
Activity 6.2 Comprehension Check:	6-80
Activity 6.1 – Answer Key	6-84
Activity 6.2 – Answer Key	6-2

Chapter 7 Application Technology.....	7-1
Planning for a Fumigation.....	7-2
<i>Sealing the Space</i>	<i>7-3</i>
Types of Space Fumigation	7-4
<i>Fumigation Chambers</i>	<i>7-5</i>
<i>Vacuum Fumigation</i>	<i>7-6</i>
<i>Fumigation Under Sheets</i>	<i>7-7</i>
<i>Fumigation of Buildings.....</i>	<i>7-9</i>
<i>Surface Application</i>	<i>7-11</i>
<i>Aeration Duct Application</i>	<i>7-11</i>
<i>Probe Application</i>	<i>7-12</i>
<i>Other</i>	<i>7-12</i>
<i>Fumigant Introduction to the Grain Stream</i>	<i>7-13</i>
<i>Fumigation of Buildings Under Sheets</i>	<i>7-14</i>
Pre-fumigation Actions for Space Fumigations	7-14
During the Fumigation.....	7-18
<i>Aeration.....</i>	<i>7-18</i>
<i>Fumigation of Containers and Railcars</i>	<i>7-19</i>
General Application of Dosage and Concentration Calculations	7-20
<i>Dose, Dosage and Concentration</i>	<i>7-20</i>
Safe Handling of Cylinders and Application Equipment	7-32
<i>Transporting Fumigant Cylinder.....</i>	<i>7-32</i>
<i>Application Equipment.....</i>	<i>7-32</i>
Equipment Maintenance	7-32
<i>Storage of Fumigant Cylinders</i>	<i>7-32</i>
<i>Disposal of Fumigant Cylinders</i>	<i>7-33</i>
Appendix 7-1: Pre-fumigation Actions for Fumigations Using Compressed Gas	7-34
Appendix 7-2: Pre-fumigation Actions for Phosphine	7-36
Activity 7.0 Comprehension Check:	7-38
Activity 7.0 – Answer Key	7-42
Chapter 8 Emergency Response	8-1
First Aid Training	8-2
Hospital/Poison Control Centre	8-2
Emergency Response Plan	8-2
Activity 8.0 Comprehension Check:	8-4
Activity 8.0 – Answer Key	8-5
Chapter 9 Professionalism.....	9-1
Expectation of a Fumigation Applicator.....	9-2
Notification Requirements	9-3
Monitoring of Fumigation Sites	9-3
Activity 9.0 Comprehension Check:	9-4
Activity 9.0 – Answer Key	9-5

1

Chapter 1 General Information

Goals

At the conclusion of this chapter you will be able to:

- understand the purpose of this manual
- describe the advantages and disadvantages of conducting a fumigation
- define fumigants, fumigant gases, vapour and fumes and their uses in pest management
- describe how fumigants are grouped, their general characteristics and properties
- describe fumigant effects on pests
- know the adverse effects of fumigants on commodities and structures and materials
- describe the factors that affect how residual a fumigant will be after aeration.

2

Chapter 2 Labelling

Goals

At the conclusion of this chapter you will be able to understand that fumigant labels have:

- a large number of prohibitions and precautions
- certification/licencing requirements
- annual training for applicators and their assistants
- requirement for fumigation management plan
- a large number of safety requirements
- fumigation zones (i.e. buffer zones) that must be maintained
- special pre-fumigation and post-fumigation requirements.

3

Chapter 3 Regulations

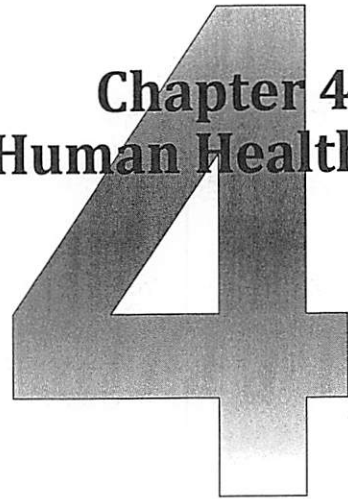
Goals

At the conclusion of this chapter you will be able to:

- describe the federal regulations that pertain to shipping a fumigant or a fumigated commodity.
- describe the requirement under the *Transportation of Dangerous Goods Act*
- describe the requirements under the *Railway Safety Act*
- describe the requirements under the *Canada Shipping Act*
- identify that individual provinces may have fumigation specific regulations
- describe the Alberta Provincial regulations related to conducting fumigations that are specified in the *Pesticide Sales, Handling, Use and Application Regulation*
- described the Alberta Provincial regulations related to conducting fumigations that are specified in the *Environmental Code of Practice for Pesticides*.

Chapter 4

Human Health



Goals

At the conclusion of this chapter you will be able to:

- Identify that applicators should undergo regular medical examinations
- Identify that pests can cause human health effects
- describe some of the health effects that pests can cause to humans.

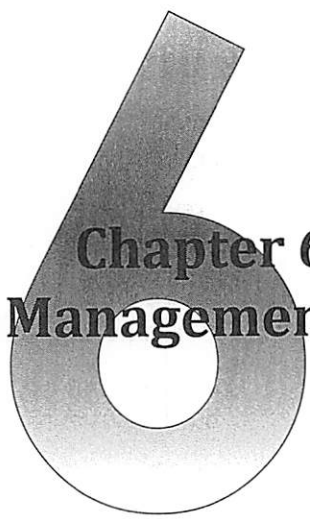
5

Chapter 5 Pesticide Safety

Goals

At the conclusion of this chapter you should be able to:

- define and describe threshold limit value – time weighted average (TLV-TWA)
- define and describe threshold limit value – short term exposure limit (TLV-STEL)
- define and describe Immediately Dangerous to Life and Health (IDLH)
- describe the components of a Fumigation Management Plan
- describe the training and certification requirements for applicators and their assistants
- describe general safety procedures when conducting a fumigation
- describe the personal protection equipment required while conducting a fumigation
- identify the fumigant detection devices that should be used to detect levels of fumigant.



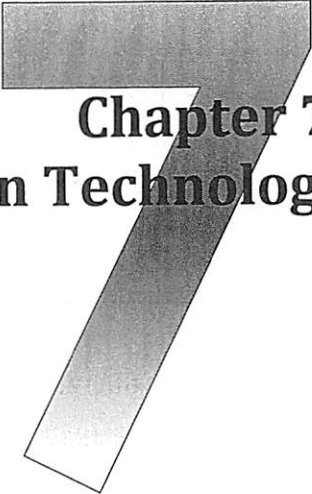
Chapter 6

Pest Management

Goals

At the conclusion of this chapter you will be able to:

- describe what a pest management includes
- describe how to conduct an IPM plan to control insects and mites
- describe how to conduct an IPM plan to control micro-organisms
- describe how to conduct an IPM to control rodents.



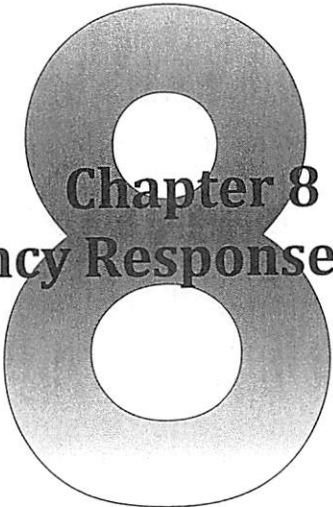
Chapter 7

Application Technology

Goals

At the conclusion of this chapter you will be able to describe:

- dosage and concentration and how they are calculated
- how to do volume calculations
- the factors that must be considered in determining a fumigation treatment
- how to fumigate commodities under sheets.
- how soil incorporators can be used for soil fumigation.
- the precautions to take when aerating the treated area.
- how fumigant cylinders should be transported.
- the checklist which is prepared prior to a fumigation.
- the procedures for cleaning fumigation equipment.
- how fumigants should be stored in a storage facility.



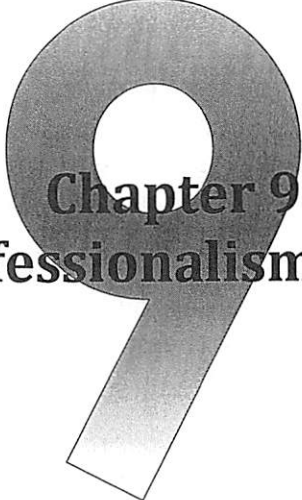
Chapter 8

Emergency Response

Goals

At the conclusion of this chapter you should be able to:

- identify the information on fumigants to be supplied to hospitals and poison control centres.
- describe the components of an emergency response plan.



Chapter 9

Professionalism

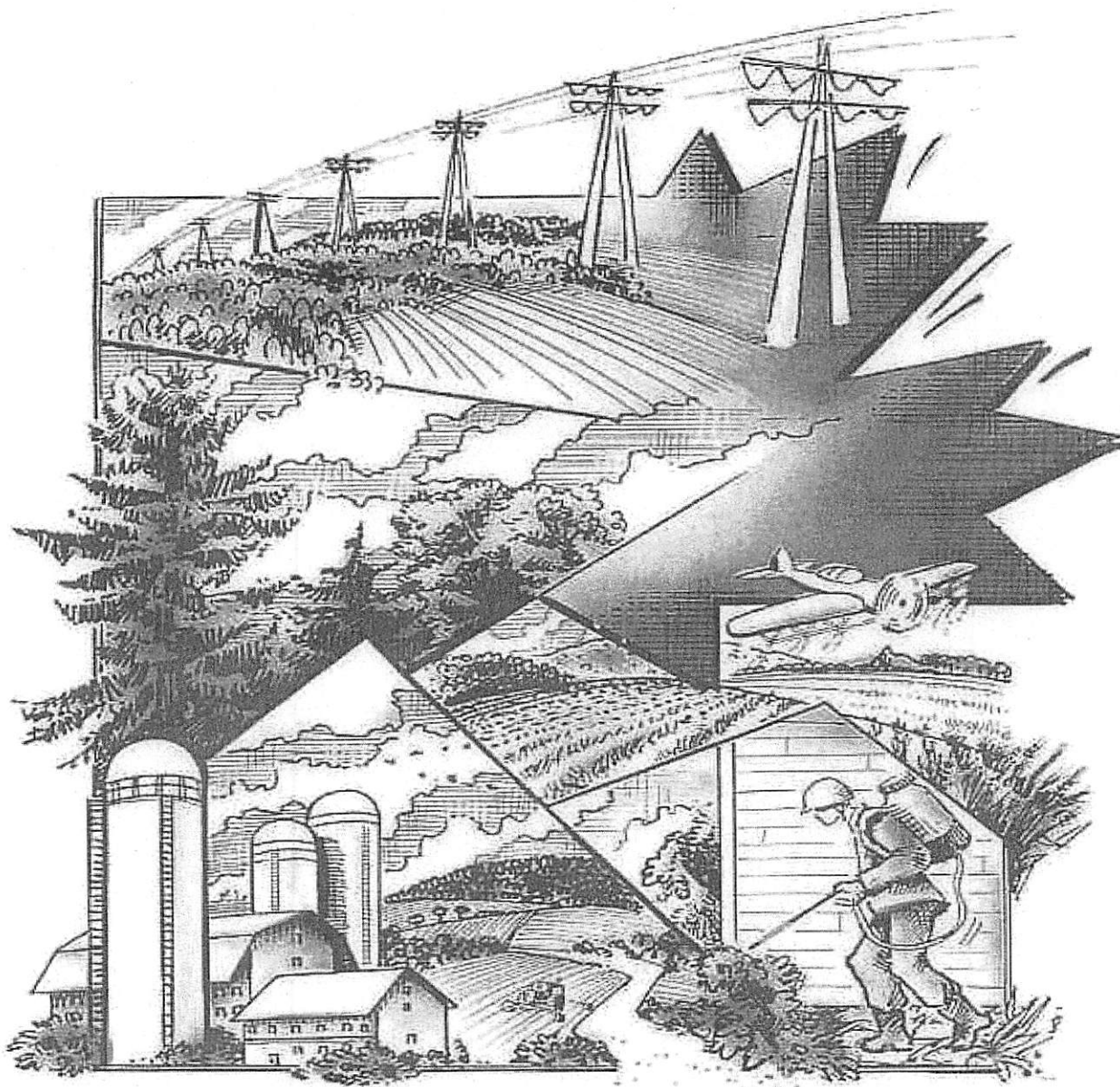
Goals

At the conclusion of this chapter you will be able to describe:

- the attributes of a professional
- notification and monitoring requirements when conducting a fumigation
- how a fumigation applicator exhibits professionalism.

Canadian Pesticide Education Program

Structural Manual



L
Lakeland
COLLEGE

Alberta 2023 Edition

Alberta

Acknowledgements

Contributors to the Canadian Pesticide Education Program

STRUCTURAL MANUAL

The content and information of the Structural Manual complies with the National Standard Pesticide Education, Training and Certification in Canada – Structural Module, Basic Knowledge Requirements (BKR) for Pesticide Education in Canada which is published by Health Canada's Pest Management Regulatory Agency. The BKR information is the minimum information that all Provinces in Canada have agreed must be included in all provincial Structural manuals.

The original 1995 edition of the Structural BKR Module was coordinated by Robert Adams, Environmental Management Branch, BC Ministry of Water, Land and Air Protection and the first draft of the module was prepared by Paul Pilley, PGP Pest Management Consultants, Lindsay, Ontario.

Review and editing of BKR drafts by the following people is gratefully acknowledged:

- Joël Gosselin, Structural Pest Control Operator, Winnipeg, Manitoba
- Steve Peltier, President, Structural Pest Management Association of Ontario
- Geoff Cutten, Ontario Ministry of the Environment
- Jim Hudson, Pest Management Regulatory Agency, Health Canada
- Kristin Macey, Pest Management Regulatory Agency, Health Canada
- Linda Gilkeson, BC Ministry of Water, Land and Air Protection
- Don McCarthy, Canadian Pest Management Association
- Sandra Shiels, Pesticide Training Consultant, Regina, Saskatchewan
- FPT Standing Subcommittee on Pesticide Education, Training and Certification
- Pest Management Regulatory Agency, Health Canada

The Canadian Pesticide Education Program, Structural Manual was written in 2020 by Vivianne Servant, (retired) Pesticide Certification Specialist, Alberta Environment and Parks and former Co-chair of the Federal, Provincial, Territorial Committee on Pest Management and Pesticides, Standing Subcommittee on Pesticide Education, Training and Certification in Canada.

The manual was reviewed and edited by Devon Smiegielski, Alberta Environment and Protected Areas (Structural Manual and BKR Update Lead) and the Federal/Provincial/Territorial Committee on Pest Management and Pesticides, Standing Subcommittee on Pesticide Education, Training and Certification (PETC).

The black text in the manual provides more description, explanation, illustrations, examples, and pictures of the Structural BKR Module information so that prospective Structural applicators can more easily understand all the concepts from the Structural BKR.

©2020 Federal, Provincial, Territorial Standing Subcommittee on Pesticide Education, Training and Certification

Legal Notice

This publication has been prepared for the Federal, Provincial, Territorial Committee on Pest Management and Pesticides, Standing Committee on Pesticide Education, Training and Certification in Canada (PETC) for educational purposes only. While every effort has been made to ensure the accuracy of the information contained in this publication, it should not be construed as legal or professional advice. For information on the use of pesticides for specific pest management problems, users may consult pest management guides available from numerous sources including:

- pesticide manufacturers
- educational resources
- university specialists
- Internet sites.

The PETC makes no representation or warranty of any kind (express, implied or statutory) in relation to this publication or its content, and assumes no responsibility or liability whatsoever arising from, or in any way connected with, the use of this publication or its content.

No endorsement of any third-party products or services is expressed or implied by any information, material or content referred to, or included in this publication.

This publication has been produced in accordance with the requirements of the CanCopy license.

Every effort has been made to provide proper acknowledgment of the original source of information and to comply with copyright law. If information is identified where this has not been done, please notify the Standing Subcommittee on Pesticide Education, Training and Certification in Canada.

Canadian Pesticide Education Program

Structural Manual

~

Table of Contents

Chapter 1 General Information.....	1-1
Goals	1-1
Overview	1-2
Use of the Manual	1-4
Grouping Pesticides	1-4
Grouping by Target Pest	1-4
Mode of Action - Grouping by Inherent Properties.....	1-5
Mode of Action - Grouping by Effect on the Pest.....	1-6
Grouping by Resistance Management or Chemical Family Groups.....	1-7
Insecticide Resistance Management/Chemical Family Groups.....	1-7
Grouping by Mode of Action	1-20
Vertebrate Pesticide Families/Resistance Management Groups	1-20
Chemical Additives.....	1-29
Activity 1.1 Comprehension Check	1-30
Activity 1.1 Answer Key.....	1-32
Chapter 2 Regulations.....	2-1
Goals	2-1
Overview	2-1
Federal Regulations Pertaining to Structural Applications	2-2
<i>Transportation of Dangerous Goods Act (TDG)</i>	2-2
<i>Food and Drugs Act</i>	2-6
<i>Species at Risk Act</i>	2-7
<i>Migratory Birds Convention Act</i>	2-8
<i>Safe Food for Canadians Act</i>	2-8

Provincial and Municipal Regulations.....	2-10
Environmental Protection and Enhancement Act, Pesticide (Ministerial) Regulation, Pesticide Sales, Use, Handling and Application Regulation	2-10
Notification Requirements for Structural Pest Control	2-11
Mobile Storage Requirements for Structural Applicators	2-11
Alberta <i>Wildlife Act</i>	2-13
Municipal Bylaws	2-14
Activity 2.1 Comprehension Check	2-15
Activity 1.1 Answer Key.....	2-17
Chapter 3 Labelling	3-1
Goals	3-1
Overview	3-1
Pesticide Labels for Structural Pests	3-3
Rodenticide Label Statements Requiring Bait Stations	3-4
Products for Use in Meat Packaging or Food Processing Plants.....	3-7
Fogging and Ultra Low Volume (ULV) Applications	3-7
Disposal of Dead Animals.....	3-8
Activity 3.1 Comprehension Check	3-9
Activity 3.1 Answer Key.....	3-11
Chapter 4 Human Health	4-1
Goals	4-1
Overview	4-1
Medical Fitness	4-2
Respiratory Protection.....	4-2
Human Health Concerns When Controlling Pests	4-3
<i>Hantavirus</i> pulmonary syndrome (HPS)	4-5
Cholinesterase Testing.....	4-5
General Pesticide Effects on Human Health.....	4-6
Insecticides.....	4-7
Rodenticides	4-8
Repellents	4-10
Petroleum Products	4-10
Activity 4.1 Comprehension Check	4-11
Activity 4.1 – Answer Key.....	4-13

Chapter 5 Pesticide Safety	5-1
Goals	5-1
Overview	5-1
General Safety Procedures	5-2
Notification Procedures	5-2
General Safety Procedures	5-4
Safety Procedures in Food/Feed Processing Facilities	5-4
Safety Procedures in Residential Areas	5-4
Safety Procedures for Ultra-Low Volume (ULV) and Fogging Treatments	5-5
Safety Procedures for Rodent and Bird Baiting	5-6
Safety Precautions for Handheld Spray Equipment.....	5-7
Restricted Entry Intervals.....	5-7
Respiratory Protection.....	5-8
Aeration Procedures	5-9
Activity 5.1 Comprehension Check	5-10
Activity 5.1 Answer Key.....	5-12
Chapter 6 Pest Management	6-1
Goals	6-1
Overview	6-1
Integrated Pest Management (IPM)	6-2
Putting IPM Into Practice	6-2
Developing an IPM program	6-2
Integrated Pest Management Plan	6-3
Structural Pests.....	6-6
Insects and Mites	6-6
Other <i>Arthropods</i> Infesting Structures	6-10
Insects, Mites and Other <i>Arthropod</i> Life Cycles.....	6-11
Pest Management for Insects, Mites and Other <i>Arthropods</i>	6-14
Prevention.....	6-15
Identification.....	6-16
Monitoring	6-17
Injury and Action Thresholds	6-22
Treatments.....	6-23

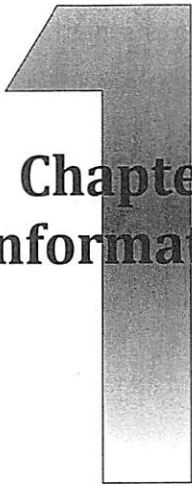
Factors Influencing the Effectiveness of Pesticides Used for Insects and <i>Arthropod</i> Control...	6-27
Evaluation	6-29
Activity 6.1 Comprehension Check	6-31
Activity 6.1 Answer Key.....	6-33
Chapter 7 IPM for Structural Insects.....	7-1
Goals	7-1
Overview	7-1
Ants	7-3
Ant Pest Management	7-7
Pesticide Treatment.....	7-9
Bed Bugs.....	7-11
Bed Bug Pest Management.....	7-12
Monitoring for Bed Bugs.....	7-13
Sanitation/Physical Approaches	7-15
Steam Treatments.....	7-15
Thermal Heat Treatments.....	7-16
Cold Treatments.....	7-17
Pesticide Treatment.....	7-17
Bees, Wasps and Hornets	7-19
Bees, Wasps and Hornets Pest Management.....	7-21
Bee, Wasp and Hornet Nests Inside Structures.....	7-23
Pesticide Treatment.....	7-23
Cockroaches.....	7-24
Cockroach Pest Management	7-25
Cultural Control Approaches.....	7-26
Pesticide Treatment.....	7-27
Clothes Moths.....	7-28
Clothes Moth Pest Management.....	7-29
Pesticide Treatment.....	7-29
Book Lice – <i>Psocids</i>	7-30
<i>Psocids</i> Pest Management	7-31
Pesticide Treatment.....	7-31
Crickets.....	7-32

Cricket Pest Management.....	7-33
Pesticide Treatment.....	7-33
Earwigs.....	7-34
Earwig Pest Management.....	7-35
Pesticide Treatment.....	7-35
Fleas.....	7-36
Flea Pest Management.....	7-37
Pesticide Treatment.....	7-39
Flies.....	7-40
Fly Pest Management.....	7-41
Pesticide Treatment.....	7-43
Appendix A.....	7-44
Activity 7.1 Comprehension Check.....	7-45
Activity 7.1 Answer Key.....	7-48
Chapter 8 IPM for Pests of Stored Grains and Commodities.....	8-1
Goals.....	8-1
Overview.....	8-1
Stored Grain and Commodity Pest Management.....	8-2
Stored Food Pests in Homes.....	8-7
Stored Food Pests in Restaurants, Food Outlets and Food Processing Facilities.....	8-9
Identification of Food Product Pests.....	8-12
Primary Stored Food Product Pests.....	8-12
Secondary Stored Product Pests.....	8-21
Tertiary Stored Product Pests.....	8-26
Stored Food Product Pest Pesticide Treatments.....	8-32
Activity 8.1 Comprehension Check.....	8-34
Activity 8.1 Answer Key.....	8-36
Chapter 9 IPM of Miscellaneous Pests.....	9-1
Goals.....	9-1
Overview.....	9-1
Carpet Beetles.....	9-2
Carpet Beetle Management.....	9-5
Pesticide Treatments.....	9-5

Silverfish and Firebrats	9-6
Silverfish and Firebrats Management.....	9-7
Pesticide Treatments	9-7
Wood Destroying Beetles	9-8
Wood Destroying Beetle Management	9-10
Pesticide Treatments	9-10
Clover Mites.....	9-11
Clover Mite Management.....	9-11
Pesticide Treatments	9-12
Miscellaneous <i>Arthropod</i> pests	9-12
Spiders.....	9-12
Spider Management	9-16
Ticks	9-16
Tick Management	9-18
Sowbugs and Pillbugs.....	9-20
Sowbug and Pillbug Management	9-21
Centipedes and Millipedes.....	9-22
Centipede and Millipede Management	9-23
Activity 9.1 Comprehension Check	9-24
Activity 9.1 Answer Key.....	9-25
Chapter 10 IPM for Vertebrate Pests.....	10-1
Goals	10-1
Overview	10-1
Vertebrate Pests	10-2
Vertebrate Pest Behaviour and Biology.....	10-4
Pest Management Methods for Vertebrate Pests.....	10-7
Legal Status of Pest Management Methods.....	10-15
Rodent Pest Management	10-15
Bird Pest Management	10-27
Other Vertebrate Pests.....	10-36
Activity 10.1 Comprehension Check	10-38
Activity 10.1 Answer Key	10-44
Chapter 11 Application Technology.....	11-1

Goals	11-1
Overview	11-1
Application Techniques.....	11-2
Types of Application Equipment.....	11-6
Sprayers	11-7
Compressed Air Sprayers	11-7
Power Hose Sprayers	11-7
Ready to-Use Pressurized Containers	11-7
Dusters	11-8
Foggers.....	11-8
Mechanical Aerosol Generators (MAGs)	11-9
Crack and Crevice Injectors.....	11-9
Paste and Gel Applications	11-10
Bait Stations	11-10
Insect and Rodent Bait Station Application Procedures.....	11-11
Avicide Bait Stations	11-12
Sprayer Terminology.....	11-13
Components of Hand Operated Sprayers.....	11-15
Agitation.....	11-23
Sprayer Calibration	11-24
Calibration of ULV Machines and Foggers	11-26
Spray Calculations.....	11-27
1. Calculating Area to be Treated	11-28
2. Calculating the Amount of Pesticide Product Required	11-30
3. Calculating the Total Amount of Spray and Water Required	11-31
4. Calculating the Amount of Pesticide and Water to Add to a Spray Tank	11-31
Calculating Dilution Application Rates.....	11-34
Calculations for Space Treatments	11-35
Calculating the Amount of Pesticide Bait	11-39
Spray Drift and Vapour Generation	11-40
Sensitive Areas.....	11-41
Water Quality and Pesticide Effectiveness	11-42
Sprayer Maintenance.....	11-43

Temporary Storage of Vehicles Containing Application Equipment and Pesticide	11-44
Activity 11.1 Comprehension Check	11-45
Activity 11.1 Answer Key	11-50
Chapter 12 Professionalism	12-1
GOALS	12-1
Overview	12-1
Elements of Professional Applicators	12-2
Knowledge Critical to Being a Professional Applicator	12-2
Updating Pest Management Knowledge	12-3
Ethical and Responsible Attitude	12-3
Professional Image.....	12-4
Safe and Effective Work Habits and Activities:.....	12-4
Communication.....	12-5
Notification Requirements.....	12-5
Public Concerns.....	12-6
Activity 12.1 Comprehension Check	12-7
Activity 12.1 – Answer Key.....	12-8
Chapter 13 Glossary.....	13-1



Chapter 1

General Information

Goals

At the conclusion of this chapter you should be able to:

- understand the purpose of this Structural manual.
- identify three main ways that pesticides are grouped.
- list the common modes of action of pesticides used in the Structural category.
- describe the types of pesticides by target pest that are used in the Structural category.
- describe the common resistance management/chemical family groups used to treat insects and other *Arthropod* pests in the structural category.
- describe the common resistance management/chemical family groups used to control vertebrate pests in the Structural category.
- describe the common additives used in the Structural category.

2

Chapter 2 Regulations

Goals

At the conclusion of this chapter you should be able to:

- describe the federal *Transportation of Dangerous Goods Act* and regulations that pertain to use of Structural class pesticides
- describe the *Food and Drugs Act* and regulations as it pertains to the use of Structural class pesticides
- describe the *Safe Food for Canadians Act* and Regulations that pertain to Structural class applications in food processing or packing plants
- describe the *Species at Risk Act* and regulations that pertain to the Structural class when controlling vertebrate pests
- describe the *Migratory Birds Convention Act* and regulations that pertain to the Structural class when controlling these birds
- identify that provinces and municipalities may have additional regulations regarding structural pest management.

Overview

The Federal government, Provinces and municipalities may have regulations that deal specifically with structural application. It is an applicator and the application company's responsibility to ensure:

- they meet all the federal requirements (described below)
- they meet all provincial requirements for the province where they will be conducting Structural applications. Every province will add the province specific information to their version of the National Structural Manual.
- they meet all municipal bylaws for the municipalities (i.e., cities, towns, hamlets etc.) where they intend to conduct a Structural service.

3

Chapter 3 Labelling

Goals

Upon completion of this chapter you should be able to describe the:

- type of information on a pesticide label that indicates it allows structural use
- specific label requirements for use of bait stations for rodenticide applications
- types of statements that may be on structural class pesticide labels with respect to applications made in food/feed processing or packing plants
- types of statements that may be on structural class pesticide applications with respect to Ultra Low Dosage or fogging applications
- label statements with respect to disposal of dead animals killed by a Structural class rodenticide or avicide.
- types of bait stations specified on rodenticide labels.

Overview

This chapter identifies that pesticides used in the Structural category must be specifically registered for use in, on, or around structures. These products can only be applied in those types of locations specified on the label. A specific application method and rate may also be stipulated for a particular pest.

The labels of pesticides registered for use in the Structural category contain a large number of prohibitions, precautions, safety instructions and other requirements. This is because insecticides and rodenticides can be very toxic to humans (especially children) and animal life (especially pets and wildlife).

4

Chapter 4 Human Health

Goals

Upon completion of this chapter you should be able to:

- identify why individuals handling or using pesticides should have a regular medical examination
- describe cholinesterase and describe the effects of repeated small exposures to organophosphates and carbamates
- identify that acute toxicity for insecticides and rodenticides is generally high
- describe how to determine toxicity and risk of exposure before using pesticides
- describe the types of physical harm that the pests they are trying to control can cause on applicators and their assistants.

Overview

General information on the health effects from the exposure of pesticides has been described in the Core Manual. This manual describes the acute toxicity levels of Structural class pesticides. Knowledge of the pesticide's toxicity allows the applicator to take steps to reduce the exposure and lower the health risk.

Applicators conducting Structural pesticide applications must have sufficient health and fitness to perform their duties. Not only do they have to access small and tight spaces to conduct appropriate pesticide applications, but they may also need to wear respiratory protection when using pesticides in these spaces with limited ventilation and circulation.

In addition, applicators must be aware of and take precautions against the risk of diseases associated with insects and rodents that they are trying to control. This chapter will describe the risks and how minimize the potential for illness or disease.

5

Chapter 5 Pesticide Safety

Goals

Upon completion of this chapter you should be able to describe:

- how ventilation systems affect applications and how to ensure adequate ventilation in a building following a structural application
- how to notify building occupants and the public prior to conducting a structural application
- factors to consider in deciding on safe re-entry times after an application.
- where pesticides should be mixed at the application site
- precautions required for pesticide application near food preparation surfaces.
- precautions for use of respirators
- general safety requirements for ULD and fogging treatments
- safety procedures required for rodent and bird baiting.
- the importance of routinely inspecting the safe operation of hand sprayers.

Overview

Structural pesticide applications, especially in residential dwellings require significant interactions between the applicator, the landlord and the tenant(s) to ensure everyone's safety. In commercial settings, it is important to ensure communication with all staff of the facility that may be affected by the application and to ensure everyone's protection.

In addition, as the applicator is conducting structural applications on a daily basis, it is important they wear appropriate personal protective equipment to ensure they protect their health. This chapter will explain the risks and how to minimize them while providing good control of structural pests.



Chapter 6

Pest Management

Goals

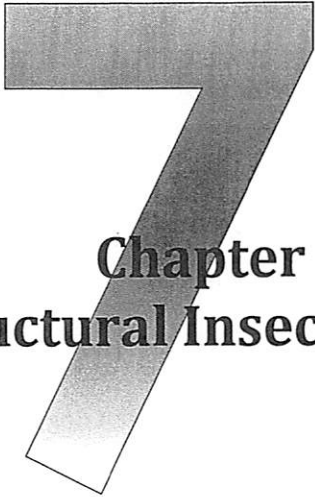
Upon completion of this chapter, you should be able to describe:

- Integrated Pest Management (IPM) approaches unique to the Structural category.
- key components of an IPM program and steps for developing an IPM Plan.
- general lifecycles of insects and Arthropods.
- how to apply an IPM program for insect and Arthropod control.
- the different types of pesticides used for insect and Arthropod pest control.
- the factors that affect effectiveness of pesticides used for insects and Arthropods.
- when vertebrate animals are pests.
- how to develop a pest management plan for vertebrate pests.

Overview

Structural pests must be controlled using an Integrated Pest Management Approach (IPM). This ensures that pests are controlled ideally when populations are low, prevention methods put in place to prevent a larger infestation, cultural control methods are used to bring population levels down to minimize the need for pesticide treatments.

In addition, monitoring pest populations and evaluating IPM approaches help to significantly improve approaches to their management. This chapter will discuss all these IPM principles specific to the Structural category.



Chapter 7

IPM for Structural Insects

Goals

Upon completion of this chapter you should be able to describe:

- Integrated Pest Management (IPM) approaches for insects, mites and other *Arthropods* in the Structural category
- the different types of pesticides used for insect and Arthropod pest control
- the factors that affect the effectiveness of pesticides used for insect and *Arthropod* control.

Overview

This chapter will provide specific IPM approaches for general insects, mites and other *Arthropods* that invade or impact structures. The general principles of IPM approaches described in Chapter 6 are customized for each pest based on their life cycle, foods they prefer and areas where they prefer to live within a structure or its surrounding areas.



Chapter 8

IPM for Pests of Stored Grains and Commodities

Goals

Upon completion of this chapter you should be able to describe:

- specific Integrated Pest Management (IPM) program for pests of stored grains and commodities
- the different types of pesticides used for insects and *Arthropods* that infest stored grains and commodities
- the factors that affect effectiveness of pesticides used for insects and *Arthropods* that infest stored grains and commodities.

Overview

There are hundreds of pests that can infest stored grain, in either on-farm storage, elevators, in warehouses or food processing facilities. The information in this chapter will identify ways to prevent and manage stored grain and commodities. The general principles of IPM approaches learned in Chapter 6 are customized for each pest based on their life cycle, stored foods they prefer and areas where they prefer to live within a structure or its surrounding areas.

Chapter 9

IPM of Miscellaneous Pests

Goals

Upon completion of this chapter you should be able to describe:

- specific Integrated Pest Management (IPM) programs to control insects that infest furniture and wooden structures
- the different types of pesticides used for insect and *Arthropod* pests that infest furniture and wooden structures
- the factors that affect effectiveness of pesticides used for insects and *Arthropods* that infest furniture and wood.
- specific IPM programs to control miscellaneous *Arthropod* pests that can invade structures
- the different types of pesticides used for miscellaneous *Arthropod* pests that infest structures
- the factors that affect effectiveness of pesticides used for *Arthropods* that infest structures.

Overview

Insects that infest furniture and wood include:

- carpet beetles
- silverfish and firebrats
- wood destroying beetles.

These pests spend most of their lifecycle inside carpets and wooden beams, window frames, walls, etc. and often do considerable damage before they are detected. They are generally more prevalent in older homes; however, all wooden structures can be affected.

10

Chapter 10 IPM for Vertebrate Pests

Goals

Upon completion of this chapter you should be able to describe:

- specific IPM programs to control vertebrate pests that affect structures or their inhabitants in the Structural category
- when vertebrate animals are pests
- how develop a pest management plan for vertebrate pests.

Overview

Vertebrate animals are animals that have a backbone and a spinal column. Vertebrate animals such as birds and rodents are pests when they damage property and when they carry diseases affecting man, animals or birds. Vertebrate pests in structural situations can cause significant damage by feeding or through their nesting and burrowing activities.

11

Chapter 11 Application Technology

Goals

Upon completion of this chapter you should be able to describe:

- the different kinds of structural pesticide applications
- the types of sprayers used for structural pest management
- how to use insecticide and rodenticide baits
- the basic components of handheld sprayers used in structural pest management
- the basic steps involved in sprayer calibration and calculations required for broadcast applications
- times when spray and vapour generation may be a concern and how it can be minimized
- the characteristics of water quality that could adversely affect the performance of the pesticide
- how to maintain application equipment.

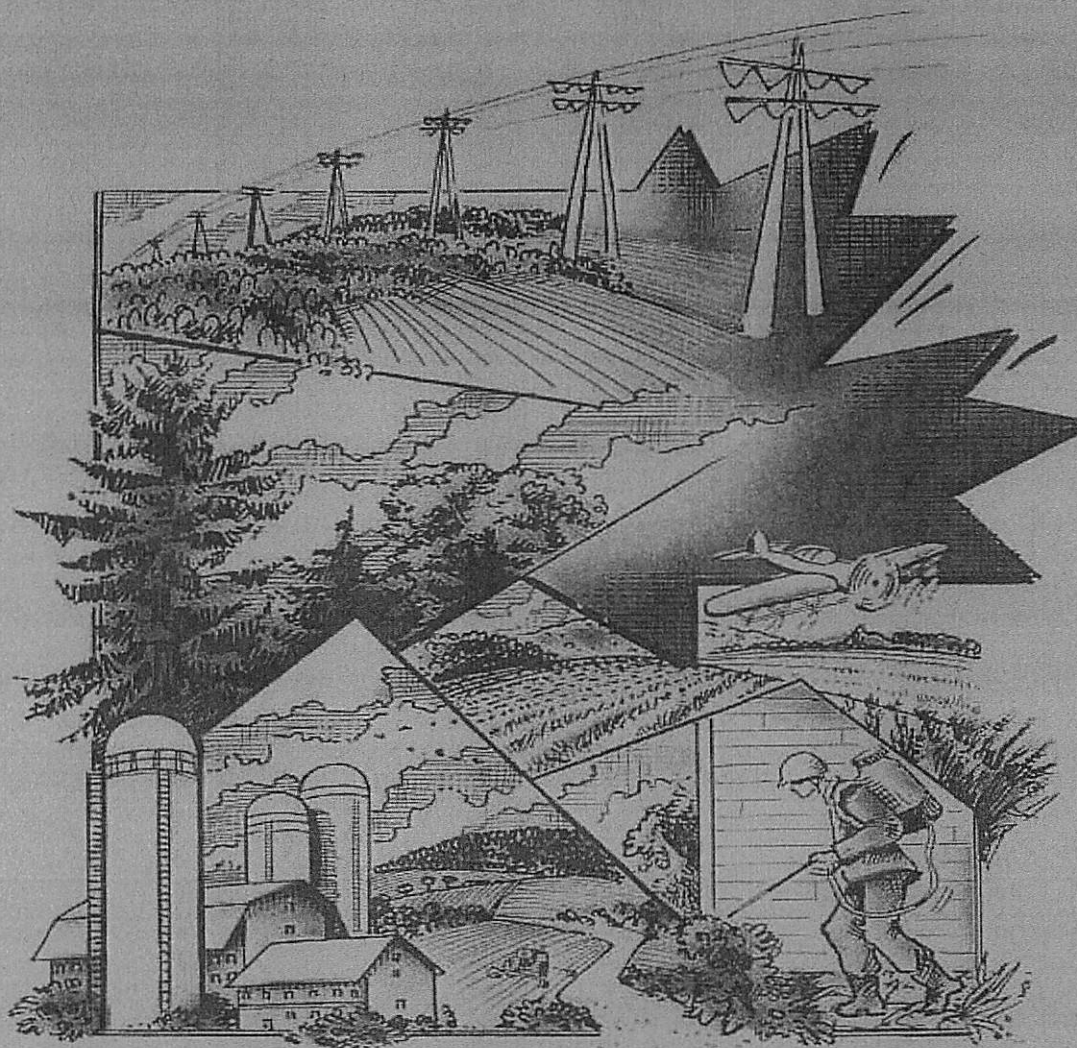
Overview

Application equipment is the backbone of a structural pesticide application. It will determine if the correct amount of pesticide is delivered in an appropriate place to effectively control a pest. It is important to know how the equipment works, how to calibrate it and how to maintain it. This chapter will provide all those aspects and other factors such as water quality and pesticide breakdown that will affect the pesticide that is being applied.

There will be specific directions on the pesticide label of the application rate, application method, and precautions that must be followed when conducting an application.

Canadian Pesticide Education Program

Applicator Core Manual



2024 Alberta Edition


Lakeland
COLLEGE

Alberta 

Canadian Pesticide Education Program

Applicator Core Manual

Originally created in 2015 by

Federal, Provincial, Territorial Committee on Pest Management and Pesticides,
Standing Subcommittee on
Pesticide Education, Training and Certification

Alberta 2024 Edition

based on the Fifth Edition 2024 of the
Standard for Pesticide Education, Training and Certification in Canada
Applicator Core Basic Knowledge Requirements



Acknowledgements

The Canadian Pesticide Applicator Program, Applicator Core Manual was published in 2015 and was a collaborative effort to produce a manual that met the Applicator Core Basic Knowledge Requirements from the Standard for Pesticide Education, Training and Certification in Canada published by Health Canada and endorsed by the Federal, Provincial, Territorial Committee on Pest Management and Pesticides.

Participation and assistance from the following groups is gratefully acknowledged:

- Atlantic Working Group on Pest Management Education and Training
- British Columbia Ministry of Environment
- Federal, Provincial, Territorial Standing Subcommittee on Pesticide Education, Training and Certification*
- Larry Schulze, Professor Emeritus - Pesticide Education, University of Nebraska— Lincoln
- National Association of State Departments of Agriculture Research Foundation
- Ontario Ministry of the Environment
- Sandra Shiels, Shiels Consulting, Regina, SK
- School of Instructor Education, Vancouver Community College, Vancouver, BC.

* The Standing subcommittee is a permanent group of the Federal/Provincial/Territorial Committee on Pest Management and Pesticides (FPT). The Standing subcommittee is comprised of a federal Pest Management Regulatory Agency representative, provincial regulatory agency members and college members. Without their dedication and commitment, this manual would not have been possible.

The **2024 Edition of the Applicator Core Manual** is based on the 2023 Applicator Core Basic Knowledge Requirements from the Standard for Pesticide Education, Training and Certification in Canada. The updated manual was drafted by Vivianne Servant, Retired Pesticide Specialist with Alberta Environment and Protected Areas and approved by PETC.

©2015 Canadian Pesticide Program Pesticide Applicator Core Manual was copyrighted by the Federal, Provincial, Territorial Standing Subcommittee on Pesticide Education, Training and Certification (FPT). All rights reserved. No portion of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means whatsoever without prior written permission of Lakeland College and Alberta Environment and Protected Areas. Printed in Canada. With permission of FPT, it was updated in 2015 to include Alberta province specific information and used by Lakeland College and approved by Alberta Environment and Protected Areas.

©2024 Edition of the Canadian Pesticide Program Pesticide Applicator Core Manual - Copyright® 2024 copyrighted by FPT. Lakeland College and Alberta Environment and Protected Areas continues to have similar permission from FPT

Canadian Pesticide Education Program

Applicator Core Manual

Table of Contents

Introduction	1
Purpose of This Manual	1
Use of the Manual	3
Benefits from this Manual	3
Chapter 1 Pesticide Names, Groups and Formulations	1-1
Overview	1-2
Key Pesticide Names and Terms	1-2
Part 1: Naming Pesticides	1-4
<i>Activity 1.1 Comprehension Check: Identifying Names</i>	<i>1-6</i>
Part 2: Grouping Pesticides	1-7
Grouping by Target Pest	1-7
Grouping by Inherent Properties	1-8
Grouping by Effect on the Pest	1-9
Grouping by Chemical Family/Resistance Management/Modes of Action Groups	1-10
<i>Activity 1.2 Comprehension Check: Grouping Pesticides</i>	<i>1-11</i>
Part 3: Pesticide Formulations	1-13
Liquid Formulations	1-15
Solid Formulations	1-17
Gases	1-21
Choice of Formulation	1-22
<i>Activity 1.3 Comprehension Check: Formulations - Advantage and Disadvantages</i>	<i>1-23</i>
Adjuvants	1-24
Types of Adjuvants	1-24
Tank Mixes	1-25
<i>Activity 1.4 Comprehension Check: Formulations</i>	<i>1-27</i>
Answers to Chapter 1 Comprehension Checks	1-29
Chapter 2 Integrated Pest Management	2-1
Overview	2-2
Integrated Pest Management	2-2
<i>Activity 2.1 Comprehension Check: Integrated Pest Management</i>	<i>2-4</i>
ELEMENT 1: Prevention	2-5
ELEMENT 2: Identification	2-5
Role of Identification in an IPM Program	2-6
Collecting Evidence for Identification	2-7
Ways to Identify Pests and Beneficial Organisms	2-7
Knowledge of Pest Biology	2-7
<i>Activity 2.2 Comprehension Check: Prevention and Identification</i>	<i>2-8</i>
ELEMENT 3: Monitoring	2-10
Types of Monitoring	2-11
Frequency of Monitoring	2-14
<i>Activity 2.3 Comprehension Check: Monitoring and Measurement</i>	<i>2-15</i>

<i>ELEMENT 4: Injury and Action Thresholds</i>	2-17
<i>Activity 2.4 Comprehension Check: injury and action thresholds</i>	2-20
<i>ELEMENT 5: Treatments</i>	2-21
Cultural Treatment.....	2-21
Mechanical/Physical Treatment	2-21
Biological Treatment.....	2-22
Behavioural Treatment	2-23
Chemical Treatment	2-23
<i>Activity 2.5 Comprehension Check: Treatment Options</i>	2-28
<i>ELEMENT 6: Evaluation of Pest Management Results</i>	2-29
Goals of Program Evaluation.....	2-30
<i>Activity 2.6 Comprehension Check: IPM</i>	2-31
<i>Activity 2.7 Final Comprehension check</i>	2-33
Answers to Chapter 2 Comprehension Checks	2-38
Chapter 3 Pesticide Labeling	3-1
Overview	3-2
Legal Status of Label	3-2
Two Components of a Label.....	3-3
Principal Information	3-4
Explanations of Principal Information Components	3-5
<i>Activity 3.1 Comprehension Check: Principal Information</i>	3-7
<i>Interpreting Precautionary Symbols and Words</i>	3-8
Other Hazards Identified on Pesticide Labels.	3-11
<i>Activity 3.2 Comprehension Check: Principal Information</i>	3-11
<i>Secondary Information</i>	3-14
Explanations of Secondary Information	3-15
<i>Activity 3.3 Comprehension Check: Secondary Information</i>	3-16
<i>Safety Data Sheet (SDS)</i>	3-18
Sections of a Safety Data Sheet	3-18
<i>Activity 3.4 Comprehension Check: SDS</i>	3-21
<i>NAFTA Labelling</i>	3-23
<i>Pesticide-Fertilizer Mixtures</i>	3-25
Answers to Chapter 3 Comprehension Checks	3-26
Chapter 4 Legislation Regulating Pesticides	4-1
Overview.....	4-2
Part 1: Federal Pesticide Legislation and Codes	4-2
<i>Pest Control Products Act</i>	4-3
Purpose of the <i>PCP Act</i>	4-3
Pesticide Registration	4-3
Pesticide Applicator Responsibilities Under the <i>PCP Act</i>	4-4
Classification of Pesticides in Canada	4-4
<i>Food and Drugs Act</i>	4-5
<i>Migratory Birds Convention Act</i>	4-5
<i>Fisheries Act</i>	4-6
<i>Transportation of Dangerous Goods Act</i>	4-7
TDG Classes	4-7
Provisions of <i>TDG Act</i> Applicable to Pesticides	4-7
Shipping and Transporting Pesticides	4-8
Placards for Dangerous Cargo.....	4-8
Responsibilities in Transporting Dangerous Goods.....	4-8
<i>Species at Risk (Canada) Act</i>	4-9

<i>Canada Labour Code</i>	4-10
<i>Workplace Hazardous Materials Information System</i>	4-10
<i>National Fire Code of Canada</i>	4-10
<i>National Building Code of Canada</i>	4-10
<i>Activity 4.1 Comprehension Check: Federal legislation</i>	4-11
Part 2: Alberta Legislation	4-14
<i>Environmental Protection and Enhancement Act</i>	4-14
Scheduling of Pesticides.....	4-15
Sale of Pesticides	4-17
Dispenser Certification.....	4-17
Registration of Pesticide Users	4-21
Applicator Certification	4-23
Applicator Assistants.....	4-27
Restricted Pesticide Applicator Certificates	4-30
Record Keeping Requirements.....	4-30
Applications Near Water.....	4-37
Diversion of Water to Fill Spray Tanks	4-41
Pesticide Storage Requirements	4-42
Storage Requirements for Pesticides Described in Schedule 3 and 4	4-46
Pesticide Mixing and Loading Requirements	4-47
Emergency Response	4-50
Pesticide Spill Reporting Requirements	4-51
Transportation Requirements.....	4-52
Disposal of Pesticides and Pesticide Containers	4-53
Enforcement	4-55
Activity 4.2 Comprehension Check: Provincial Legislation	4-59
<i>Occupational Health and Safety Act</i>	4-62
Occupational Health & Safety Regulation.....	4-62
Occupational Health and Safety Code	4-63
<i>Weed Control Act</i>	4-68
<i>Agricultural Pests Act</i>	4-71
<i>Fisheries (Alberta) Act</i>	4-73
<i>Wildlife Act</i>	4-75
<i>Local By-Laws</i>	4-75
<i>Activity 4.3 Comprehension Check: Provincial Legislation</i>	4-76
<i>Answers to Chapter 4 Comprehension Checks</i>	4-79
Chapter 5 Protecting Human Health	5-1
<i>Overview</i>	5-2
Part 1: Understanding and Managing Risk	5-2
Risk of Personal harm	5-2
Exposure	5-6
<i>Four Right Ways to Reduce Exposure</i>	5-7
<i>Activity 5.1 Comprehension Check: Human Health</i>	5-10
Part 2: Routes of Exposure	5-12
<i>Four Routes of Exposure</i>	5-12
Part 3: Pesticide Poisoning	5-17
Symptoms of Poisoning	5-17
Responding to Poisoning.....	5-19
<i>Activity 5.2 Comprehension Check: Human Health</i>	5-20
<i>Answers to Chapter 5 Comprehension Checks</i>	5-23

Chapter 6 Pesticide Impacts on The Environment.....6-1

Overview.....	6-2
Environment and Pesticides.....	6-2
Part 1: Fate of Pesticides in the Environment.....	6-4
Adsorption	6-4
Volatilization	6-6
Vapour Drift.....	6-7
Spray Drift	6-7
Soil Drift.....	6-10
Runoff.....	6-10
Leaching	6-11
Degradation	6-12
Activity 6.1 Comprehension Check: Environment	6-15
Part 2: Contamination and impacts on Water Environments.....	6-19
Activity 6.2 Comprehension Check: Water Environment.....	6-24
Part 3: Impacts of Pesticides on Plants and Animals	6-27
Activity 6.3 Comprehension Check: Plant& Animal Impact	6-30
Activity 6.4 Comprehension Check	6-34
Answers to Chapter 6 Comprehension Checks	6-35

Chapter 7 Personal Protective Equipment7-1

Overview.....	7-2
Part 1: The Importance of Personal Protective Equipment.....	7-2
Personal Protective Equipment – First Line of Defense	7-2
Responsibility for Personal Protective Equipment.....	7-3
Assessing Risk When Choosing Personal Protective Equipment	7-4
Activity 7.1 Comprehension Check: PPE – Part 1	7-9
Part 2: Types of Personal Protective Equipment	7-11
Dermal Protection	7-11
Eye Protection	7-14
Respiratory Protection.....	7-15
Activity 7.2 Comprehension Check: PPE - Part 2.....	7-19
Part 3: Care of Personal Protective Equipment	7-22
Cleaning Clothing and Equipment.....	7-22
Goggles	7-23
Respirators.....	7-23
Storage and maintenance	7-23
Activity 7.3 Comprehension Check: PPE - Part 3.....	7-24
Answers to Chapter 7 Comprehension Checks	7-27

Chapter 8 Working With Pesticides Safely8-1

Overview.....	8-2
The Three Key Elements of Safety	8-2
Knowledge	8-2
Training	8-3
Attitude.....	8-4
PART 1: Selecting, Transporting and Storing Pesticides	8-4
Pesticide Selection and Purchase.....	8-4
Determining the Amount of Product to Buy	8-4
Formula for Determining Amount	8-5
Determining Number of Containers.....	8-5
Formula for Determining Number of Containers.....	8-5

<i>Transporting Pesticides</i>	8-6
<i>Storing Pesticides</i>	8-7
Location	8-7
Temporary Storage Facility	8-9
Storage Procedures.....	8-9
Follow Good Housekeeping Procedures	8-10
<i>Activity 8.1 Comprehension Check: Selecting, Transporting and Storing</i>	8-12
PART 2: Mixing, Loading and Applying Pesticides	8-15
<i>Mixing and Loading</i>	8-15
<i>Personal Protective Equipment (PPE)</i>	8-15
<i>Mixing and Loading Guidelines</i>	8-16
Guidelines for Mixing Pesticides	8-16
<i>Application Guidelines</i>	8-18
Pre-Application Safety Guidelines.....	8-18
Application Safety Guidelines	8-19
Restricted Entry Intervals.....	8-19
Pregrazing and Preharvest Intervals	8-21
Care of Application Equipment	8-21
Application Records	8-22
<i>Activity 8.2 Comprehension Check: Mixing, Loading and Applying</i>	8-25
Part 3: Disposal of Containers and Excess Pesticides	8-29
<i>Disposal of Pesticide Containers</i>	8-29
Disposal Guidelines	8-29
Rinsing Procedure	8-29
Container Disposal Procedure	8-30
Concentrate Disposal Guidelines	8-30
Surplus Tank Mixture Disposal.....	8-31
<i>Activity 8.3 Comprehension Check: Disposal</i>	8-32
Answers to Chapter 8 Comprehension Checks	8-34
Chapter 9 Emergency Response	9-1
Overview.....	9-2
Part 1: Emergency Response Planning	9-2
<i>Developing a Plan</i>	9-3
<i>Elements of an Emergency Response Plan</i>	9-3
<i>Practice and Review ERP</i>	9-4
<i>Activity 9.1 Comprehension Check: Emergency Response Planning</i>	9-6
Part 2: Dealing with Specific Emergencies	9-8
<i>Pesticide Spills</i>	9-8
Dealing with Spills.....	9-9
PESTICIDE FIRES.....	9-13
<i>Activity 9.2 Comprehension Check: Dealing with Emergencies</i>	9-15
Part 3: Responding to Medical Emergencies	9-17
<i>Being Prepared for Pesticide Poisoning</i>	9-17
<i>General First Aid for Pesticide Poisoning</i>	9-18
<i>Activity 9.3 Comprehension Check: First Aid</i>	9-22
Answers to Chapter 9 Comprehension Checks	9-25
Chapter 10 Application Technology	10-26
Overview.....	10-27
Part 1: Application Equipment	10-28

<i>Equipment Selection</i>	10-28
<i>Location and Selection</i>	10-29
<i>Components</i>	10-29
<i>Operation Procedures</i>	10-31
<i>Nozzle Condition</i>	10-31
<i>Activity 10.1 Comprehension Check: Application Equipment</i>	10-31
PART 2: Application Procedures	10-34
1. <i>Understand how the equipment works</i>	10-34
2. <i>Follow instructions on pesticide labels</i>	10-34
Recommended Pesticide Rate	10-34
3. <i>Calibration of Application Equipment</i>	10-37
4. <i>Application Equipment Maintenance</i>	10-38
<i>Activity 10.2 Comprehension Check: Application</i>	10-39
PART 3: Weather Conditions	10-41
<i>Pesticide Drift</i>	10-41
<i>Activity 10.3 Comprehension Check: Weather</i>	10-44
PART 4: CALCULATIONS	10-45
<i>Area calculation</i>	10-45
<i>Calculating the Volume of Spray to Use</i>	10-46
<i>Computing a Percent (%) Solution</i>	10-47
<i>Activity 10.4 Comprehension Check: Calculations</i>	10-49
<i>Answers to Chapter 10 Comprehension Checks</i>	10-51
Chapter 11 Professionalism	11-1
<i>Overview</i>	11-2
<i>Professionalism</i>	11-2
<i>Elements of Professionalism</i>	11-3
Knowledge	11-3
Attitude.....	11-4
Image	11-5
Work Habits and Activities	11-5
Communication.....	11-6
<i>Activity 11.1 Comprehension Check: Professionalism</i>	11-7
<i>Answers to Chapter 11 Comprehension Checks</i>	11-11

Chapter 1

Pesticide Names, Groups and Formulations

Goals

At the conclusion of this chapter you will be able to:

- define the key terms.
- list three ways of naming pesticides.
- list at least three ways of grouping pesticides.
- identify the general types of pesticides used to control insects or diseases, mites, weeds, rodents, and slugs.
- name the different kinds of pesticide formulations and the correct abbreviations for each.
- describe advantages and disadvantages of each type of formulation.
- explain the function of different kinds of adjuvants (additives).

Chapter 2

Integrated Pest Management

Goals

At the conclusion of this chapter you will be able to:

- define the process of Integrated Pest Management
- explain the six elements of Integrated Pest Management
- describe injury thresholds
- describe action thresholds
- describe the five treatment categories.

Chapter 3

Pesticide Labeling

Goals

When you have completed this chapter, you should be able to:

- describe the legal status of pesticide labels
- identify the principal information components on a pesticide label
- identify the secondary information components on a pesticide label
- interpret label information
- identify additional pesticide product information on an Safety Data Sheet (SDS)
- explain the relevance of NAFTA labelling.

Chapter 4

Legislation Regulating Pesticides

Goals

At the conclusion of this chapter you will be able to describe:

- the *Pest Control Products Act* and Regulations
- how *Food and Drugs Act* regulates pesticides
- how the *Migratory Birds Convention Act* regulates pesticides
- how the *Fisheries Act* regulates pesticides
- how the *Transportation of Dangerous Goods Act* regulates pesticides
- pesticide legislation specific to the province in which you work.

5

Chapter 5 Protecting Human Health

Goals

At the conclusion of this chapter you will be able to:

- identify the difference between acute and chronic toxicity
- describe how the acute toxicity of a pesticide is measured
- identify symptoms of poisoning
- describe 4 ways pesticides can enter the human body
- describe factors that affect the amount of exposure for pesticide applicators
- describe how applicators can reduce their exposure and personal risk of harm.

Chapter 6

Pesticide Impacts on The Environment

Goals

At the conclusion of this chapter you should be able to:

- describe the processes that affect the fate of pesticides in the environment
- identify beneficial and harmful effects of the processes affecting pesticides
- describe how to prevent pesticides from harming water and organisms that depend on the water
- describe how to prevent pesticides from harming land environment and its inhabitants.

Chapter 7

Personal Protective Equipment

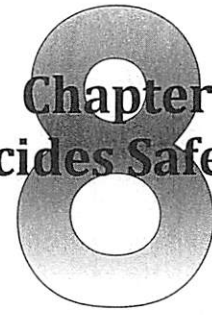
Goals

At the conclusion of this chapter you will be able to:

- explain the role of personal protective equipment in pesticide safety
- describe protective clothing and equipment
- describe how to clean and maintain protective clothing
- describe how to clean and maintain protective equipment
- identify different types of respirators
- identify appropriate protective clothing using the pesticide label and application procedure.

Chapter 8

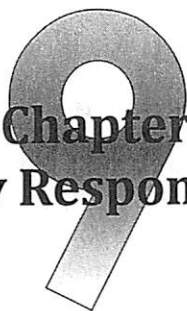
Working With Pesticides Safely



Goals

At the conclusion of this chapter you will be able to:

- identify the factors to consider when choosing a pesticide
- calculate the amount of product to buy
- describe how to transport pesticides safely
- describe how to store pesticides safely
- describe how to mix and load pesticides safely
- describe how to apply pesticides safely
- describe how to clean and maintain application equipment safely
- describe how to dispose of pesticides and containers safely.



Chapter 9

Emergency Response

Goals

At the conclusion of this chapter you will be able to:

- explain the value of an Emergency Response Plan
- describe how to respond to a pesticide spill
- describe how to respond to a pesticide fire
- describe how to respond to the theft of a pesticide
- describe how to perform first aid after pesticide exposure.

Chapter 10

Application Technology

Goals

At the conclusion of this chapter you will be able to:

- identify the basic objective of a pesticide application
- define:
 - recommended pesticide rate
 - recommended sprayer output
 - calibrated sprayer output
- identify the importance of application equipment calibration
- explain the importance of proper application equipment maintenance
- describe how the environment affects pesticide application
- describe how to minimize pesticide drift
- calculate area of a rectangle and circle
- calculate percent (%) solution
- determine if nozzle output falls within accepted requirements.

11

Chapter 11 Professionalism

Goals

At the conclusion of this chapter you will be able to:

- identify the traits that enable an applicator to deal professionally with the public
- identify why it is important to be knowledgeable about your profession
- describe the qualities of a professional attitude
- describe the work habits and activities that contribute to a professional job
- describe how to communicate with the public