Australian Environmental Pest Managers Association

Code of Industry Best Practice
Pest Management in the Food Industry

4th Version - 2021

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References
Food Standards Australia New Zealand
Australian Quarantine Inspection Service – Pest & Vermin SOP
AS/NZS ISO 31000:2009 – Risk Management

INTRODUCTION

As the Professional Pest Management industry's peak national bodi**es,** the Australian Environmental Pest Managers' Association ('AEPMA') and the Pest Management Association of New Zealand are committed to promoting a culture of professionalism and innovation, not only in pest management but also in allied and associated industries.

This Code of Practice (CoP) has been written to complement the Australia New Zealand Food Standards Code and is intended to promote Best Practice in Pest Management in Food Premises. This code is also meant to inform, train, and educate stakeholders in safe and appropriate Pest Management Best Practice specific to food handling operations and the delivery of food which is unaffected by pests. Whether it's a tiny take-away coffee shop in a back lane, or a huge multi-national food manufacturing plant stretching for acres in every direction, the safe handling of food is universally regulated by law and subject to standards and compliance which must be adhered to.

Importantly, to become more professional and innovative, industry stakeholders need to re-examine how they do things and find new and better ways of achieving superior results. They need also to embrace and commit to continuous improvement in all aspects of enterprise development and planning; business practice; financial management; project management; workforce management; and use of technology.

AEPMA and PMANZ believe technology, particularly information technology, has the potential to be a major driver of change in the pest management industry. Already, we are seeing major growth in, for instance: electronic tendering and documentation; job costing, job tracking and personnel; vehicle and equipment tasking; data communication; virtual design; project data and database sharing across and between disciplines; and energy management. All these innovative technologies are having, and will continue to have, significant impacts on industry practices.

We believe those enterprises and individuals which embrace new technologies into their businesses will become increasingly competitive.

For its part, AEPMA will continue to actively support and promote industry-wide professionalism, ethics-driven innovation, and ever higher standards of performance and behaviour through initiatives such as:

- a 'gold standard' Code of Ethics; and
- professional accreditation through PestCert; and
- improved standards of training and education for industry practitioners; and
- the development of 'National Competency Standards'; and
- developing, preparing, and actively promoting industry 'Codes of Best Practice'; and
- ever increasing investment in cost-effective communication within the industry and between the industry and its stakeholders.

AEPMA Codes of Practice and Guidelines – Australia Only

AEPMA is committed to developing, preparing, and promoting definitive 'Codes of Practice' and 'Guidelines' describing and providing expert guidance on best practice across an increasing range of key pest management areas.

Codes of Practice which have already been published and which, as 'living documents', are continually being reviewed and updated include:

- Code of Practice – Prior to purchase Timber Inspections
- Code of Practice – Pest Management in the Food Industry
- Code of Best Practice – for Termite Management
- Code of Best Practice – for Rodent Management
- Code of Best Practice – for Termite Management During Construction
- Code of Practice for the Control of Bed Bug Infestations in Australia

Other Codes under development include:

- AEPMA's Code of Practice for Training in the Pest Management Industry.

PMANZ Codes of Practice and Good Practice Guidelines – New Zealand Only

- Code of Practice - Use of Rodent Glueboards
- Good Practice Guide - Disposal of a ('live') Rodent caught on Glue-board
- Good Practice Guide - The Safe and Humane Use of Live Capture Traps
- Good Practice Guide - Signage for Vertebrate Toxic Agents Outside Workplace
- Good Practice Guide - Safe Work Practices in the Urban Pest Management Industry
- Good Practice Guide - Ultra-Low Volume (ULV) Cold Fogger Misting
- Good Practice Guide - The Use of Air Guns in Pest Control
- Good Practice Guide - Pesticide Disposal in Urban Pest Management
- Good Practice Guide - Respiratory Protection Equipment
- Good Practice Guide - Operation of Thermal Fogging Equipment
- Good Practice Guide – Live Capture Traps

Version currency

Codes of Practice and Guidelines are living documents and it is therefore important that the latest version is read and relied on. If in doubt, check with AEPMA to ascertain if a Code of Practice or Guideline is the latest version.

Document Administration and Review

AEPMA's and PMANZ Industry Code for Pest Management in the Food Industry in Australia and New Zealand, elsewhere referred to as 'this Code', and/or 'this Code of Practice') was initiated on behalf of the professional pest management industry by the Australian Environmental Pest Managers' Association (AEPMA and PMANZ), the peak professional association for timber and other pest management services in Australia and New Zealand.

To develop and prepare the Code of Practice, AEPMA and PMANZ appointed a working party comprising:

- leading pest management professionals;
- representatives of companies and organisations responsible for the design, development, manufacture, delivery and installation of termite management systems and technologies; and
- other relevant stakeholders

This Code of Practice remains the property of AEPMA and PMANZ which publishes this Code of Practice online. The latest version is available from: http://www.aepma.com.au/Codes-of-Practice.

Administration

This Code will be administered by an Administrative Committee made up of:

- The Executive Director of AEPMA who shall also act as Compliance Officer.
- A 'Working Party' of dedicated subject matter experts, including representatives from AEPMA and PMANZ.

Any appointments by AEPMA and PMANZ shall be at the discretion of the respective AEPMA and PMANZ National Boards.

Should any Committee members resign from the Administrative Committee, the AEPMA and PMANZ boards may appoint another person deemed appropriate.

Should any Committee member not be available to attend a Committee meeting, the AEPMA Board may appoint a person deemed appropriate as a replacement for that meeting only.

The Code Administrative Committee is tasked with:

a) The smooth administration of the Code.

b) Monitoring and ensuring the complaints mechanism outlined in the Code is being followed.

c) Ensuring an external review of the Code and public input into the Code occurs every three years.

d) Maintaining an effective complaint handling scheme.

e) Taking whatever action is deemed necessary to protect the integrity of the Code.

f) Withholding registration to the Code from any individual/firm who, in the opinion of the Committee, is unable to fulfil the obligations of the Code.

Data Collection

The Administrative Committee shall keep data on a confidential basis on:

a) The number of complaints lodged – by whom and about whom.

b) The number found to be in breach of the Code and why.

c) The number found not to be in breach of the Code and why.

d) The time taken to deal with complaints.

e) Details on monitoring activities.

f) The number and types of recommended remedial action.

Review and Annual Report

There is to be an ongoing review process every 12-24 months.

The Administrative Committee will meet every 12 months to consider any ongoing administration issues and every three years, there will be a formal review and update of the entire Code.

The Committee shall meet every 12 months and:

a) Conduct a review of the operation of the Code and its effectiveness in achieving fair trading outcomes.

b) Produce an Annual Report of Code Signatories and regulatory agencies summarising details and complaints, actions taken, the Committee's views on overall levels of compliance with the Code, full disclosure of Code Signatories who were found in breach of the Code, and Code Signatories whose accreditation of participation has been removed.

c) Ensure the Code is relevant and responds effectively to complaints and disputes.

The Annual Report shall also review and report on the following performance indicators:

a) The level of industry awareness of the Code;

b) The level of consumer awareness of the Code;

c) The level of awareness of the Code within the food industry;

d) Whether complaints have dropped with respect to the issues the Code is designed to address;

e) Whether the complaints mechanism is readily accessible and visible; and

f) The effectiveness of compliance mechanisms.

The Committee will meet within one month of the publication of the Annual Report to:

a) Consider the Annual Report;

b) Consider Committee nominations from the Compliance Officer;

c) Consider any recommendations for amendment to the Code (every ~~2~~ 3 years) which would improve the overall effectiveness of the Code.

Every three years from the date of commencement of the Code, the Annual review will be followed by an external review/audit of the operation of the Code. This will be carried out by an external reviewer and the AEPMA Board, with public input sought.

- Monitoring and ensuring the complaints mechanism outlined in the Code is being followed.
- Ensuring an external review of the Code and public input into the Code occurs every three years.
- Maintaining an effective complaints handling scheme.
- Taking whatever action is deemed necessary to protect the integrity of the Code.

- Withholding registration to the Code from any individual/firm who, in the opinion of the Committee, is unable to fulfil the obligations of the Code.

Consultation with Regulatory Bodies

To ensure there is no conflict between this Code of Practice and any policy, legislation, or relevant technical requirements, AEPMA has consulted with the following relevant Australian regulatory bodies:

- The Australian Competition and Consumer Commission (ACCC)
- The Australian Pesticides and Veterinary Medicines Authority (APVMA)

In relation to each body, we note the following points:

1. The ACCC has provided guidelines for developing effective industry Codes of Conduct to improve industry compliance with the Trade Practices Act and to promote self-regulated best practice market behaviour. This Code has been developed using the ACCC's guideline framework.

2. Voluntary signatories to this Code of Practice (stakeholders who certify their compliance with, and agreement to, work to the requirements of the Code) are, in effect:

- working above existing regulatory minimum requirements; and
- working to address gaps and deficiencies in those 'minimum requirements'.

Please note: This Code of Practice aims to establish and recommend industry best practice for pest management, in the food industry however all signatories must ensure they have also complied with the minimum standards imposed by governments. This Code of Practice is not intended to contradict any legislated requirements and cannot be read as opposing any such requirements.

The AEPMA Code of Ethics underpins and provides an ethos for all aspects of professional pest management. In particular, the AEPMA Code of Ethics:

- Underpins best-practice by pest management professionals and pest management industry ('industry') stakeholders; and
- Obliges all industry stakeholders to oppose and call out unethical behaviour by others in the industry;
- Requires all industry stakeholders operating at all levels to adopt ethical principles and practices consistent with the industry's Codes of Best Practice and Australian Standards; and
- Requires all industry stakeholders who adopt this Code of Best Practice to deal only with industry parties whose standards of performance and behaviour conform to those expected by this Code.

The AEPMA and PMANZ Code of Ethics can be viewed in full on the AEPMA website: www.aepma.com.au and on the PMANZ website www.pmanz.nz

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CONTACT AEPMA

1. CODE GUIDE

1. Effective Pest Management requires a partnership between client/customer and the pest management contractor. Mutual understanding is all. The pest management contractor must have a clear understanding of the client/customer's needs and the client/customer of what is technically possible and economically viable. This understanding can be reached by following the CoP specifications which clearly define the service to be provided whilst avoiding unreasonable or unrealistic demands of the customer and contractor. This publication seeks to provide food businesses with responsibilities to suit their premises and give users of pest management services information regarding expectation by the food service or contractor.

2. This Code of Practice (CoP) has been developed by Australian Environmental Pest Management Association (AEPMA) and Pest Management Association of New Zealand (PMANZ), in consultation with an industry working group, to provide guidance on the Integrated Pest Management (IPM) principles applied to the Food Industry in the respective countries. It also covers the identification and management of pests and the risks associated with pests most commonly found in the Food Retail and Manufacturing and Distribution.

3. The document is divided into numbered and titled sections for each stakeholder. It states both the importance of pest management and need for partnerships between the stakeholders in the food industry, and details the importance of IPM in these partnerships and the responsibilities of each partner in achieving the desired outcomes in terms of the safety of food and management and elimination of pests.

4. Sections 1 - 9 deal with the scope and purpose, dispute resolution, importance of Pest Management, current compliance and standards, regulatory environment and HACCP principles that govern the food industry. Sections 10 and 11 set down the importance of the relationship, IPM and developing a plan, and the respective responsibilities of the stakeholders. Section 12 and 13 deal with the requisite documentation, auditing, and evaluation of the pest management program. Section 14 details management methods of the pests commonly encountered in the food industry. Section 13 deals with Organic Food sites. And finally sections 15 -19 cover Training and Accreditation, Glossary of Terms and References and Appendices to this CoP

5. Although it is encouraged that all stakeholders are aware of the contents of the Code of Practice, specific sections relate more directly to different stakeholder groups.

6. The list below identifies the sections that relate specifically to each stakeholder group:

   - Pest Managers: All sections
   - Salespeople: Sections 1 - 4, 7 - 9, 11 - 14 and 17
   - Food Business - Sections 1 – 14 and 17
   - External Auditors / Compliance Companies - Sections 1 – 4, 7 – 14 and 17
   - Chemical Manufacturers, Suppliers
   - General Public

7. There will inevitably be situations where some of the IPM and pest management requirements contained in this document may not be applicable. The fundamental question in every case is "what is necessary and appropriate on the grounds of food safety and the management of pests?"

8. In practice, this means that, although most recommendations will be generally appropriate and reasonable, there will nevertheless be some situations where a recommendation is neither necessary nor appropriate on the grounds of food safety and practicality. In deciding whether a recommendation is necessary or appropriate, an assessment of the risk should be made, preferably within the framework of the HACCP approach and Pest Risk. This approach allows the responsibilities of each stakeholder to be flexibly and sensibly applied with a proper regard for the overall objectives of producing food which is safe and suitable for consumption and managing the pest risk appropriately. In so doing it takes into account the diversity of responsibilities and pest management activities and varying degrees of risk involved in managing pests. Additional guidance is available in specific food codes from the technical support of service provider companies, either through entomologists or technical field managers and auditors.

9. It is not possible to draw up a specification or even a model which can simply be adopted by each potential client/customer. Too many variations occur in the geography and age/type of premise and equipment, the nature of the business being conducted, how that business is operated, its sensitivity to infestation by pests and possible control methods. What can be given is an outline of the responsibilities, specifications, practices and expectations of each party, no matter how long the work duration.

10. This document gives guidance on the strategies to avoid pest infestation and on the precautions, each need to be considered when carrying out responsibilities and treatments to manage pests in Australia and New Zealand. It assumes that those who use the guidance are competent and have been adequately trained, and assessed as competent, to a standard whereby they are capable of using pesticides and products that are intended for application only by professional registered users.

11. This CoP is aimed at all those who conduct pest management operations as professional providers and users of pesticides, material, devices, and pest risk management. That includes those who identify and manage hazards and risks as a part of their professional and/or occupational duties within a food business or processing plant. A wide range of users fall into this category including those working as professional Pest Management technicians, both in the public and private sectors, quality assurance controllers and managers, food production professionals, food auditors and those who conduct their own Pest Management , where regulations permit, in the food industry, such as restaurant and café managers, store-keepers and janitors, who need to control pests to protect property, installations and produce.

12. This CoP endeavours to provide a reference document with broad acceptance by the pest management industry, which would be a guide to Pest Managers, the Food Industry, allied Service Industries and Professions on best practice in the management of pests in the Food Industry in Australia and New Zealand.

13. This CoP provides general advice in specific pest management and risk and is meant to be additional to other advice, which may be available from technical literature and other statutory publications.

14. This document does not include all comment or discussion on every aspect of the safe use of hazardous substances because to do so would be repeating what is already available in other recognised official documents.

15. Pest Managers and Food Businesses are encouraged to use the advice and guidance provided in this CoP when developing their own risk management plans, health and safety policies and procedures to ensure that pest management industry best practice is incorporated.

16. Wide consultation has been undertaken in the development of this CoP and every effort has been made to ensure the information is accurate and up to date. If any errors or omissions are identified these should be referred to AEPMA/PMANZ so that changes can be made. The electronic format is designed to enable changes to be made easily and cost effectively.

2. PREFACE

This Code of Practice (CoP) has been written to complement the Australia New Zealand Food Standards Code and is intended to promote Best Practice in Pest Management in Food Premises. This code is also meant to inform, train, and educate stakeholders in safe and appropriate Pest Management Best Practice specific to food handling operations and the delivery of food which is unaffected by pests.

Whether it's a tiny take-away coffee shop in a back lane, or a huge multi-national food manufacturing plant stretching for acres in every direction, the safe handling of food is universally regulated by law and subject to standards and compliance which must be adhered to.

3. KEY STAKEHOLDERS

- Pest Managers
- Field Biologists
- Account Managers
- Pest Salespeople
- Food Business
- External Auditors / Compliance Companies
- Chemical Manufacturers, Suppliers
- General Public

4 OBJECTIVES, SCOPE and PURPOSE OF THIS CODE OF BEST PRACTICE

The aim of the CoP is to provide a reference document for use by Pest Managers and Food Businesses in partnership to define Best Practice in managing Pests at Food Premises. The structure and delivery of pest services within food environments demands specific and esoteric knowledge, skills, and capabilities. This Code of Industry Best Practice is intended to guide and empower stake-holders in this process.

Specific aims are to:

- Establish and maintain a guide or reference which provides a level of tangible prescriptive information with a view to creating Australian uniformity and consistency regarding procedures, protocols and methodologies which supports safe, professional and quality Pest Management service delivery to the food industry.

- Define the roles and responsibilities to achieve the desired outcomes to assure food safety.
- Incorporate IPM practices into the Food Industry.
- Provide Pest Management that complements the Food Standards Australia New Zealand (FSANZ), Food Standards Code and Food Businesses Food Safety Programs.
- Provide a source of reliable information to Pest Managers and Food Businesses on some of the key drivers in each of their industries and for them to better understand the decisions and needs of each.
- Be a source from which training will be developed.

The CoP will include the following areas; commencing post-harvest and concluding at point of sale to the consumer:

- Good Manufacturing Practices (GMP)
- Work Health and Safety and Environmental requirements
- Security requirements
- Risk Management procedures
- Pest Management procedures
- Assessment of the Pest Manager's Performance
- Training for management and staff of Pest Management and Food Businesses

5 DISPUTE RESOLUTION

The Pest Management Industry has a strong focus on consumer complaint handling and dispute resolution. As a result, we are actively committed to helping resolve any complaints or concerns about the way in which a pest management service has been provided. A complaint is defined as any breach of the Code to which a consumer and a pest manager are in disagreement over the quality of the work performed or not performed under the Code.

To help ensure speedy and fair outcomes to any disputes between stakeholders over the design, delivery, installation, performance, or any other issue relating to integrated pest management, all parties who agree to comply with (sign) this Code of Practice also agree to be bound to comply with the Code's dispute resolution procedure.

Dispute Resolution in NZ would be covered by Contract and Commercial Law Act 2017. This law covers pest control services intended for commercial clients that are covered by a contract or service agreement typically used in the industry.

Specifically, all parties agree:

- any complaint arising out of works carried out under this Code will be presented in writing in a timely manner;

- to attempt to reach a consensus over any dispute by sharing their evidence and position using the following escalating pathway.

Resolving Complaints and Disputes

1. Code Signatories must have a documented customer complaints handling procedure, which is:

(a) Easy and free to access; and

(b) Complies with the Australian Standard on Complaints Handling – Customer Satisfaction, Guidelines for Complaints Handling in Organisations (AS ISO 10002-2006).

2. In the first instance, when a dispute occurs, a client should contact their Pest Manager to reach a mutually acceptable outcome.

3. If the parties cannot finalise the dispute through the Code Signatories' customer complaints handling procedure within 30 days, the complaint can be referred to the Code Compliance Manager (AEPMA). In this case, the matter should be outlined in writing to the Compliance Manager and include any relevant supporting documentation. Notification/lodgement can be made via the AEPMA website (www.aepma.com.au).

4. The Code Compliance Manager will acknowledge the complaint within two (2) business days of receiving it. When lodging a complaint, additional information may be requested to assist with investigations.

5. The Code Compliance Manager will investigate the complaint and inform parties of the outcome within five (5) business days of receipt.

Note: In certain circumstances an investigation may take longer than five (5) business days, such as a delay in communication from third parties. In this case, the Compliance Manager will endeavour to keep all parties informed and will:

(a) inform all parties of the reason for the delay; and

(b) specify a date when a decision can reasonably be expected.

6. Information will be provided to all parties in writing, unless it has been mutually agreed that it can be given verbally.

<u>Complaints Escalation Process</u>

1. If a complainant is not satisfied with the outcome proposed by the Code Compliance Manager/ AEPMA, they must advise AEPMA within 15 business days of being notified of the outcome of the investigation.

2. The Code Compliance Manager/AEPMA will then refer the complaint to the Code Disciplinary Committee within three (3) days of notification. Annually, the Administrative Committee will elect a Disciplinary Committee, consisting of a minimum of three and up to a maximum of five members.

3. The process, including timeframes and contact details will be notified to all parties.

Types of Complaints accepted:

1. The Code Compliance Manager (AEPMA) and Disciplinary Committee will only accept complaints:

(a) Relating to an incident or issue arising no more than 6 months before a complaint is referred to AEPMA; and

(b) That fall within the categories of eligible complaints outlined in the table below.

2. If a complaint is not accepted by the Code Compliance Manager or the Disciplinary Committee, it may be referred to the relevant State consumer protection agency or court.

6 CODE OF PRACTICE COMPLIANCE

NON-COMPLIANCE

Election of Disciplinary Committee and Sanctions

Annually, the Administrative Committee will elect a Disciplinary Committee, consisting of a minimum of three (3) and up to a maximum of five (5) members, who have extensive working knowledge of Pest Management in food handling environments.

The Disciplinary Committee shall:

(i) investigate, including requesting information from accredited members of the Code, any disputes or ongoing activities that may bring the Code into disrepute.

(ii) recommend any orders appropriate to ensuring the ongoing credibility of the Code including:-

Sanction	Description
1. Rectification Orders	This requires a Code Signatory to rectify any consequences of their actions in a manner and within a timeframe determined by the Disciplinary Committee. For example, this may require providing a full or partial refund for any services provided.
2. Improvement Notices	This is a written order requiring a Code Signatory to change their behaviour, policies or processes and to take whatever action may be specified by the Disciplinary Committee within a specific timeframe.
3. Warning Notices	This informs the Code Signatory that their behaviour or actions were unacceptable in the circumstances and that if further breaches are identified, additional sanctions may be imposed.
4. Publication Orders	This requires a Code Signatory to publish (in whatever format the Disciplinary Committee determines) a corrective advertisement.

5. Public Notification	This publicly notifies the general community via the AEPMA website of a Code Signatory's actions and the outcome of the Disciplinary Committee's investigation.
6. Re-training Order. Re-application Fee	This requires a Code Signatory or their staff members to successfully undertake further development or training as specified by the Disciplinary Committee and payment of a new application fee.
7. Suspension or cancellation of Code Accreditation	If appropriate, the Disciplinary Committee may recommend to the Administrative Committee that a Code Signatory's accreditation be suspended or cancelled, depending on whether the complaint indicates a substantial or a significant breach of the Code. Code Signatories can find a description of these types of breaches in the Glossary section of this Code.

(iii) shall provide a report in writing and include results of the Committee's deliberation;

(iv) have the power to withdraw accreditation to the Code any company/firm/individual/system they believe brings the Code into disrepute.

An appeal to the decisions of the Disciplinary Committee may be made to the Administrative Committee within 21 days and will state:

- The reasons for the appeal based on the facts; and
- Why the penalty is considered inappropriate.

Decisions of the Disciplinary Committee shall be reviewed annually by the Administrative Committee

7 THE IMPORTANCE OF PEST MANAGEMENT IN THE FOOD INDUSTRY

Food production practices, along with the management of food safety has experienced constant change over the last few decades. Safe and nutritious food is increasingly becoming a sought after commodity the world over. More and more, consumers and governments are demanding food which is free of disease and pathogens.

The Food and Agriculture Organisation in the U.S. estimates that if post-harvest food loss related to pest activity could be reduced by 50%, there would be enough food to feed the world's population.

A 2010 CSIRO analysis indicated 'what rodents eat and spoil globally could feed 280 million people in developing countries for a year (Meerburg et al. 2009a)'

The world's population is now odds-on to swell ever-higher for the rest of the century, posing grave challenges for food supplies, healthcare and social cohesion. A ground-breaking analysis shows there is a 70% chance that the number of people on the planet will rise continuously from 7bn today to 11bn in 2100 (source: The Guardian UK)

Forget iron-ore and coal. Food security and bio-security will become paramount. All stakeholders will need to become more efficient and resourceful. The agriculture industry will be looking to improve yields on crops and stock, and will also need to focus on reducing food loss from pests.

What are the challenges for the food industry?

- To meet the food quantity and quality needs of growing populations
- Meet stricter government food safety and quality regulations
- To comply with increasingly demanding proprietary food safety standards

How can the Pest Management Industry help the food industry?

- Reduce food loss and food contamination from pest activity
- Help the food businesses to comply with increasingly demanding food safety standards and assist them with passing their audits
- Provide pro-active and re-active pest management services via innovation, research and technology
- Provide pest related advice, recommendations and guidance to the food industry, including education and training
- Align our two industries (food and pest management) through harmonisation of procedures, expectations and outcomes

One of the mechanisms or tools available to all stakeholders within the sphere of pest management to the food industry is the **Food Safety Management System or Standard.**

What is a Food Safety Management System (FSMS)?
An FSMS simply put, is a set of processes and procedures (checks and balances) in combination or in sequence that prevents or minimises the likelihood of contamination of food. FSMS's provide performance criteria to measure both the operations and practices of the food business and the processes and procedures involved in **supplier pre-requisites, including Integrated Pest Management** service delivery.

An FSMS can be specific to a particular type of food production sector or to different food manufacturing processes or there are some which are a suite of standards which cover all aspects and processes in the food chain. Many of the food safety management standards also combine a certification scheme for suppliers and/or manufacturers. The original or first formerly recognised international Food Safety Standard was HACCP.

In 1993, Codex Committee on Food Hygiene recognized HACCP as the global standard for food safety and published their first HACCP guidelines, which would be later adopted by the Codex Alimentarius Commission, the joint body of the Food and Agriculture Organization (FAO) and the World Health Organization (WHO).

8 SAFE FOOD PRODUCTION AND THE DEVELOPMENT OF THE HACCP PRINCIPLES

What does HACCP stand for?

- Hazard
- Analysis
- Critical
- Control
- Point

What is HACCP and where did it come from?

- **HACCP is a RISK BASED FOOD SAFETY MANAGEMENT SYSTEM** originally developed by engineers and scientists from the Pillsbury Company in the U.S. as a "Zero Defects" program for NASA Astronauts in the 1960's (preventing astronauts becoming ill in space from food borne illness).

- The first HACCP Standard was released in the late 1980's by the U.S. National Advisory Committee on Microbiological Criteria for Food.

- The first international HACCP Standard was published in 1992 after being adopted by the Codex Alimentarius Commission.

- The Codex Alimentarius Commission (CAC) is a collection of internationally recognised standards, codes of practice, guidelines and recommendations related to the production and safety of food. The CAC was established by the Food and Agriculture Organisation (FAO) of the United Nations in 1961 and the World Health Organisation (WHO) partnered with it in 1962.

- The HACCP concept and process is **based on identification of specific food safety hazards** which could cause illness, injury or death if the food is consumed and the **implementation of controls needed to minimise or avoid this**. In other words, the emphasis is on **prevention rather than end product evaluation, inspection and testing**.

- HACCP is **not intended to control all hazards** that may impact all or part of the food supply chain. Instead, it is intended to build on existing best practices and quality management procedures employed in these sectors and **focus on areas where significant hazards need specific control.**

- **HACCP is really the foundation of all food safety systems** and is underpinned by the 7 sequential phases or processes in the system, called the 'HACCP Principles':

    1. Conduct Hazard Analysis
    2. Identify Critical Control Points
    3. Establish Limits for each Critical Control Point
    4. Develop a System for Monitoring each Critical Control Point
    5. Establish Corrective Actions
    6. Establish Verification Procedures
    7. Establish Documentation and Record Keeping

- Codex defines how these principles are practically applied using a logical sequence of steps. By following each step in sequence, users can develop a HACCP plan which is based on their specific food product and associated processes.

- The 7 HACCP Principles are supported by 5 'Preliminary Steps' when an effective HACCP Program is being developed. These are:

1. Assemble the HACCP Team
2. Describe the Food and its Distribution
3. Describe the Intended Use and Consumers of the Food
4. Develop a Flow Diagram Which Describes the Process
5. Verify the Flow Diagram

- Put simply, the purpose of HACCP is to **PREVENT FOOD CONTAMINATION.**

- Examples of well-structured HACCP based food safety management system standards are SQF Food Safety Code, FSSC 22000 Food Safety Management and British Retail Consortium Global Food Safety Standard (BRC).

HACCP Australia's *Food Safety Standard; Pest Management Services for Food Businesses* is an effective and well-structured standard for pest management businesses.

Food and Agriculture Organization of the United Nations (FAO), *General Principles of Food Hygiene CXC 1-1969* contains the HACCP principles Download the 2020 revision of the HACCP Code here: http://www.fao.org/fao-who-codexalimentarius/codex-texts/codes-of-practice/ (click the green check/tick mark on the right side of the page to download).

What is meant by a 'Critical Control Point' (CCP)?

- This is a HACCP based term which means a specific point in the food manufacturing process where control(s) can be put in place to prevent, reduce or eliminate the possibility of a food safety hazard. This CCP concept is really a tool or mechanism which enables a potential problem to be identified and then actions or controls identified and put in place to avoid or decrease the likelihood of that problem occurring.

- This concept can be applied to any aspect or process of the food production chain **including pre-requisite programs like pest management**

9 THE REGULATORY ENVIRONMENT

The Pest Manager and the Food Business have an obligation to conform to all required Statutory Regulations. Both parties will need to be aware of these requirements to ensure pest management processes and procedures are legally compliant.

9.1 The Pest Manager Requirements

A person must be licensed to use pesticides in pest management procedures in the course of a Pest Management business. Licensing is a State/Territory responsibility in Australia. (For further information see Section 17 – Training and Accreditation of Pest Managers).

In New Zealand the pest management industry is regulated by the Environmental Protection Authority (EPA), Hazardous Substances (Hazardous Property Controls) Notice 2017. In addition, it is recommended for Pest Managers that want to undertake pest management work with New Zealand food related businesses, be a registered member of PMANZ, which requires that they hold relevant pest management qualifications.

A licensed Pest Manager seeking to comply with this Code is required (but not limited) to:

- Comply with all Work Health and Safety and Welfare Acts, applicable Codes of Practice and Standards
- Comply with all National and State regulations that apply to pest management (including relevant Pesticides Acts)
- Apply pesticides in accordance with the product label directions and industry and government approvals (e.g. APVMA / DAWE / EPA/MPI).
- Keep records of pesticides applied.
- Hold current policies for Professional Indemnity and Public Liability Insurance.
- Complete regular documented training of staff appropriate to relevant Food Safety certifications and Accreditations e.g.: HACCP / WQA / COLES / YUM / AIB / BRC
- Complete regular documented training of staff specifically developed and aligned to this code egg: AEPMA
- Become a signatory to this code

9.2 The Food Business Requirements

In addition to all legal requirements, a Food Business may also need to comply with additional standards for commercial reasons. The Food Business should explain to the Pest Manager the relevant sections of the standards, Codes or regulations to which they must comply.

Examples of additional standards are, (but not limited) to;

- WQA (Woolworths Quality Assurance)
- Coles Food Manufacturing Supplier Requirements Food Safety Standards
- YUM/KFC Pest Management Standard - Australia
- American Institute of Baking (AIB)
- BRC (British Retail Consortium)
- HACCP (Codex Alimentarius)
- International Food Standards (IFS)
- ISO 22000 (FSSC 22000)
- SQF (Safe Quality Food)

10 CURRENT FOOD STANDARDS AND COMPLIANCE

Food Standards Australia New Zealand (FSANZ) is an independent statutory agency established by the Food Standards Australia New Zealand Act 1991.

The system for the development of joint Australia New Zealand food standards was first established under a treaty between Australia and New Zealand signed in December 1995.

Within Australia, the system is based upon the initial 1991 Commonwealth, State and Territory Agreement in relation to the adoption of uniform food standards. This system continues in operation under the Food Regulation Agreement 2002 and is implemented by food legislation in each State and Territory and in New Zealand, and by the Food Standards Australia New Zealand Act 1991 (FSANZ Act) of the Commonwealth of Australia.

The FSANZ Act establishes the mechanisms for the development and variation of joint food regulatory measures (a food standard or a code of practice) and creates Food Standards Australia New Zealand (the Authority) as the agency responsible for the development and maintenance of a joint Australia New Zealand Food Standards Code (the Code).

Although the Authority develops food standards, responsibility for enforcing and policing food standards rests with the States and Territories in Australia and the New Zealand government in New Zealand. Further, in relation to food imported into Australia, the Commonwealth, through the Imported Food Control Act 1992, enforces the Code. Within each jurisdiction there are one or more agencies responsible for food surveillance charged with the task of ensuring the requirements of the Code are met.

Australia New Zealand Food Standards Code

The Code is a collection of individual food standards. Standards on related matters are grouped together into Parts, which in turn are collected together into four chapters.

Chapter 1 deals with standards which apply to all foods, with the exception of Maximum Residue Limits (MRLs) and processing requirements for which New Zealand has its own regulations.

Chapter 2 deals with standards affecting particular classes of foods. Food hygiene is not part of the joint food standards system.

Chapter 3 covers Food Safety Programs, food premises and equipment and food hygiene and safety issues in general, specific to Australia. New Zealand has its own food hygiene arrangements. This chapter is relevant to pest management.

Chapter 4 contains standards dealing with the primary production of food in Australia. Again, New Zealand has its own arrangements for primary production of food.

Food standards have the force of law. It is an offence in New Zealand, and a criminal offence in Australia to supply food that does not comply with relevant food standards. Notwithstanding food standards, it is also an offence to sell food which is damaged, deteriorated or perished, which is contaminated, or which is unfit for human consumption. Because food standards are given legal effect by State, Territory and New Zealand laws, it is important to read the Food Standards Code in conjunction with the relevant food legislation.

All Food Businesses are required to comply with relevant food standards.

There are four additional national food safety standards which apply to Food Businesses in Australia.

FSANZ developed these standards in consultation with national and state Health Authorities, the Food Industry, and other interested organisations and individuals.

Specific to New Zealand

The New Zealand Ministry for Primary Industries is responsible for the development and enforcement of food safety standards in New Zealand.

There are a range of food regulatory requirements within New Zealand. Importantly all food for sale in NZ must comply with the Food Act 2014, along with the Food Standards Australia New Zealand (FSANZ) Code of Practice. MPI is also responsible for food regulation in the domestic and export sectors including that made under the Animal Products Act 1999, Wine Act 2003, and is also accountable for the implementation of regulations made under the Agricultural Compounds and Veterinary Medicines Act 1997.

A Risk Management Program (RMP) is a documented program, designed to identify and control hazards and other risk factors in relation to the production and processing of certain animal material and animal products, to ensure that the resulting animal product is fit for its intended purpose.

The Food Act's provisions relating to composition and labelling, including those found in the Food Standards Code, apply regardless of whether operations are managed under a food safety program (FSP), RMP or the Food Hygiene Regulations. RMP operators must comply with the Food Standards Code.

10.1 The Five Food Safety Standards under Chapter 3 of the Australia New Zealand Food Standards Code (Australia)

The five Food Safety Standards are:

3.1.1 Interpretation and Application.

3.2.1 Food Safety Programs.

3.2.2 Food Safety Practices and General Requirements; and

3.2.3 Food Premises and Equipment.

3.3.1 Food Safety Programs for food service to vulnerable persons.

Together, these standards form a preventative approach to the incidence of food-borne illness in Australia (only) and are designed to help ensure Food Businesses produce food that is safe to consume.

Pest Managers servicing a Food Business should understand and comply with the sections of the Food Standards Code applying to Pest Management (refer to appendix).

11 RELATIONSHIP BETWEEN PEST MANAGER AND THE FOOD BUSINESS

Pest Management is a GMP program pre-requisite for the Food Business.

Food safety is best ensured through the identification and control of hazards in the production, manufacturing and

handling of food as described in the Hazard Analysis and Critical Control Point (HACCP) system, adopted by the joint WHO/FAO Codex Alimentarius Commission, rather than relying on end product inspection alone. The Food Law enables Australian and New Zealand authorities to require Food Businesses to implement a Food Safety Program based upon the HACCP concepts. The Food Safety Program is to be

implemented and reviewed by the Food Business, and is subject to periodic audit by a suitably qualified Food Safety Auditor.

As a part of its' Food Safety Program, the Food Business should ensure all physical, microbiological and chemical risks for all processes are identified including those related to Pest Management .

It is expected that the Food Business and Pest Manager would work together to ensure any risks are managed.

If a Pest Manager identifies any additional risks, these should be raised with the site Pest Management Contact for consideration in Food Safety Documentation.

Role of the Pest Management Contact(s) at the Food Business

The Food Business should appoint a Pest Management Contact or Officer as the main point of contact for the Pest Services company and the Pest Management Technicians who visit that site. The Pest Management Contact should have the authority to carry out or oversee the Pest Manager's recommendations.

It is the responsibility of the Pest Management Contact to:

- Advise the Pest Manager of any relevant issues e.g. Potential site risks, sensitive issues or unused areas which may harbour pests, either current or past, which may affect their work.
- Advise the Pest Manager of any current pest activity sighted or significant pest activity history.
- Advise the Pest Manager of any issues that affect the Pest Management Technician's work on site (Refer to Section 7 – Induction into a Food Business Site).
- Facilitate access to all areas where inspection and/or treatment will be required.
- To encourage continuous feedback from the staff of the Food Business, especially Pest activity. A system of recording this information and passing it to the Pest Manager should be developed e.g.: A 'Client Pest Sightings Log'
- To review and action (where required) documentation in the Site Service Register supplied and maintained by the Pest Manager.

The Pest Manager will report both verbally and in written form, on their activity (frequency of visits, areas treated and type of re-treatment (in hard copy Service Report, Electronic Reporting where enabled or Pest Monitoring Sheets) and recommendations (Hygiene and Maintenance Reports) to the Pest Management Contact. They will agree on the frequency of face-to-face meetings to discuss the reporting and recommendations. When Pest activity is high, this can be as frequent as each time the Pest Management Technician is on site. Less frequent face-to-face meetings may be appropriate when pest activity is low.

Signed Pest Services Proposal/Contract

This is provided to the prospective client by the pest manager. It outlines what the pest company is offering the client regarding Pest Management services and for what fees. It can include a contractual agreement section where the client and the pest manager both sign and date in designated areas, which then forms the signed 'Service Agreement' or signed 'Legal Contract'

Sometimes, the client will prefer to have their own service agreement/contract version signed but they will still need to have the 'Service Proposal' from the pest manager so they know in advance what they are receiving (Scope of Works) along with how much they will need to pay for the pest services.

The Pest Management company must find out the details of any audit systems and food safety accreditations required prior to preparing a quotation.

12 INTEGRATED PEST MANAGEMENT (IPM)

The Importance of Integrated Pest Management
The importance of the integrated approach cannot be emphasised enough regarding food handling establishments.

Generally speaking, an effective IPM Program should maximise general pest exclusion (pest proofing) and suppression (via sanitation and pest harborage reduction) of pests combined with the use of reactive measures to eliminate pest outbreaks promptly. Arguably, the most important IPM facet is Monitoring and Inspection.

The Importance of Monitoring and Inspection
It can be said that a genuine Integrated Pest Management Program for high risk environments such as food production and handling facilities, begins and ends with INSPECTION and MONITORING. Inspection is really the central component of the whole Monitoring equation. It's involved at the very beginning of an IPM program, including the Site Risk Analysis and the initial setting-up of the IPM Program, and used to detect pest entry and/or incipient pest activity with the objective of avoiding established pest infestation.

Physical or visual inspection should not be neglected irrespective of the monitoring measures in place.

Even the most technologically advanced monitoring program installed and maintained meticulously, does not negate the need for regular VISUAL inspections. This includes pheromone monitoring and electronic monitoring programs.

Successful outcomes are rarely, if ever realized without regular, thorough inspection procedures and methods.

There are many types of inspection for a variety of reasons and a variety of purposes. Stored product insects are often unwittingly introduced into food establishments via deliveries of food ingredients and food-based supplies on road and rail transport vehicles. Two common types of visual/physical inspections conducted within a structured IPM Program are:

1. Routine inspections of the premises – a dedicated critical (good and bad) check of the premises to identify potential problematic areas, conditions conducive or attractive to pests, and of course, active pests.

2. Follow-up Inspections of situations or locations where pests or evidence of pests has been seen by staff from the premises. This can be the result of documented entries in the 'Staff Pest Sightings Log'

12.1 What is Integrated Pest Management?

Integrated Pest Management is the systematic implementation of preventative (proactive), reactive and corrective measures comprising a combination of safe, effective processes and methods which are used to avoid, minimise or eliminate Pests from an area. Input and co-operation from all parties (including the food business) concerned is crucial in achieving the desired outcomes.

<u>Who and What form the 'integration'?</u>

The 'integrated' term is applied concurrently to two separate parts of the pest management equation in a food site.

1. The integration between the main stakeholders/entities (Food Site and Pest Manager) playing their respective parts

2. The integration of various Pest Management procedures, actions, methods, technologies and products

An integral component of Food Safety Management Systems is the requirement for a food handling business to maintain a regular, structured and documented Integrated Pest Management (IPM) Program. And from what we have seen in previous chapters, there is much to consider when providing pest management services to a food client/site.

The following table summarises who is responsible for what, regarding the two main stakeholders (food business and pest services provider).

REQUIRED ACTIONS	FOOD BUSINESS	PEST MANAGER	FOOD SITE AND PEST MANAGER TOGETHER
IPM PROGRAM Ensure there is a documented Integrated Pest Program (IPM) based on Risk Analysis of site and food operations developed by an accredited Field Biologist or other suitably qualified expert	Ensure there is a documented Integrated Pest Program (IPM) developed by an accredited Field Biologist or other suitably qualified expert	Develop and maintain a structured and documented Integrated Pest (IPM) Program based on Risk Analysis of site and food operations Include safe, effective and appropriate Pest Preventation, Pest Monitoring and Pest Treatment methodology and procedures Conduct regular site inspections and IPM Audits Develop and provide comprehensive and appropriate documentation	Communication - Meetings Documentation - Reports - Inspections - Audits
EVALUATION and CONTINUAL IMPROVEMENT OF IPM PROGRAM	Ensure the Integrated Pest Program (IPM) is regularly reviewed and evaluated by an accredited Field Biologist or other suitably qualified expert to ensure it is safe, effective and appropriate	Develop and provide comprehensive and appropriate documentation Conduct regular site inspections and annual IPM Audits	**Communication** - Meetings **Documentation** - Reports - Site Inspections - IPM Program Audits **Consultation**

DOCUMENTATION and RECORDS	Ensure the Integrated Pest Program (IPM) Program is documented and regularly reviewed to be fit for purpose Ensure detailed accurate records of all IPM related procedures, pest activity and service reports are kept	Regularly review the Integrated Pest Program (IPM) Program regularly to ensure it is documented correctly and fit for purpose Provide detailed accurate records of all IPM related procedures, pest activity and service reports to the food business	Development, Layout and formatting of documentation and records should be done in collaboration and agreed upon
PEST ENTRY Maintain the integrity of the building and building fabric to minimise pest entry	Exclude pests in the first place (screens, doors, air curtains, proofing).	Provide advice and recommendations to food business as applicable	Communication - Meetings Documentation - Reports - Inspections -
PEST CONDUCIVE CONDITIONS Grounds, landscaping and internal areas should not provide a pest habitat, food source or access to buildings	Maintain a regular Grounds Maintenance Program Create a quarantine area to segregate infested incoming goods Minimise harbourages for pests by sealing cracks, crevices All external building lights should emit yellow light (to decrease attraction to night flying pests) Lighting set away from buildings should be white light to attract night flying pests away from the facility	Monitor and Inspect regularly for breaches and provide advice and recommendations to food business as applicable Conduct regular site inspections and annual IPM Audits	Implement a systematic improvement program and promote open communication Communication - Establish regular meeting schedule Meetings Documentation - Report Inspections and Audits

CLEANING and SANITATION -Minimise conditions that provide a food source or attract pests	Maintain a documented regular Cleaning and Sanitation Program Internal/external bins should be emptied regularly and have close fitting lids All food spills should be cleaned up immediately Used cooking fat/grease or food scraps should not be left around exterior of buildings uncovered Manage odour emissions	Monitor and Inspect regularly and provide advice and recommendations to food business as applicable Conduct regular site inspections and IPM Audits	As above
MAINTENANCE and CLEANING All food spills should be cleaned up immediately	Maintain documented Machinery and Equipment Program Rotate products (first in, first out)	Monitor and Inspect regularly and provide advice and recommendations to food business as applicable Conduct regular site inspections and IPM Audits	As above
WAREHOUSING and STORAGE	Maintain practical and accessible storage to permit inspection, cleaning and treatment Elevate pallets off ground Create space behind and between bulk stored and finished goods Internal walls should be kept clear of stock/stored materials	Monitor and Inspect regularly and provide advice and recommendations to food business as applicable Conduct regular site inspections and IPM Audits Provide and update Site Service Register	Communication - Meetings Documentation - Report Inspections -Establish regular meeting schedule

INCOMING GOODS INSPECTION Maintain an incoming Goods Inspection Procedure to minimise pests being transported into the facility on goods	All incoming stock and pallets should be checked thoroughly upon arrival before being moved inside the facilities Create a quarantine area to segregate infested incoming goods	Regular monitoring of pest activity and establish appropriate treatment response and methods to address varying pest activity levels Conduct regular site inspections and where appropriate (internal audits of the IPM Program) Establish follow-up and review process (post treatment)	Implement a systematic improvement program and promote open communication Communication - Establish regular meeting schedule Meetings Documentation - Report Inspections and Audits
CROSS INFESTING OF GOODS Minimise the potential for food and facilities to become infested from pests	Create a quarantine area to segregate infested incoming goods which have been transported to site on deliveries or from localised pest outbreaks already occurring in the facility	As above	

Who does what

Further to the above, brief descriptions follow, of several of the respective responsibilities for both parties. In the list above, the responsibility varies as some items are more appropriately done by the Food Business while others logically lie with the Pest Manager. However, who does what, and the selection of the best option will require an understanding of Pest biology and behaviour. The Pest Manager will have a role to advise the Food Business.

Exclusion and Proofing

Preventing the Pest(s) from entering the area to be protected is an obvious first step. This can take several forms, such as design of the building to prevent access, installation of barriers, inspection of incoming goods for Pests, and minimisation from Pests from surrounding areas. Section 12 Main Targeted Pests has specific information for each of the main Pest types. The following is general comment for all Pests on all sites.

Building Design

As well as being appropriate for the activities for which the premises are used, the design and construction of food premises should:

- not permit the entry of Pests
- not provide harborage for Pests
- not attract or encourage Pests

These are not always well considered in the building design and the Pest Managers may need to identify building and design problems which may lead to Pest harborage and infestation on the Food Business site. This is most likely done at the initial inspection but may also become apparent during on-going servicing.

The Pest Manager needs to recommend to the Food Business steps they can take to correct building design faults.

Barriers
The installation of barriers to an existing building is a likely outcome of the identification of design faults. Examples may include, but are not limited to, the following:

- Exterior vents are screened.
- Construction joints area sealed.
- Gaps between outer walls and pavement are sealed.
- Gaps under and around doors are well sealed
- Doors shut automatically (self-closing) if left open or not closed
- Holes in roof and walls are sealed.
- Strip curtains or air curtains on doors that are open for long periods.
- Positive pressure ventilation that provides an outward-moving barrier to flying insects (and dust) when doors are opened.
- Screens installed on windows.
- Drains are sealed/screened.
- Electrical penetrations are sealed.
- Any gaps or holes allowing pest entry are sealed

Inspection of Incoming Goods
Incoming goods can be a source of Pests incursion. Warehouse procedures need to be developed to manage this access mode. The Pest Manager can advise on what to look for and where.
Any goods that are infested should be quarantined until treatment to eliminate the Pest is carried out.

Surrounding Areas
If there are high numbers of Pests in the immediate area outside the area to be kept free of Pests, this adds to pest pressure on the barriers. In these instances, IPM would include steps to reduce the exterior pest pressure. These are pest specific and covered in Section 15.

Harborage/Habitat
All Pests seek areas where they are sheltered and protected. These areas are also Pest breeding sites. The type of area is Pest specific and details are found in Section 12. The Pest Manager should advise after the initial site inspection and as necessary. Some general comments that cover all situations are:

- All areas to be kept neat and tidy, free of rubbish and clutter.
- All products to be stored off the ground.
- All products to be a suitable distance off the wall perimeter to allow access for inspection and cleaning.

Other situations that provide harborage can be:

- Incorrectly stored plant and machinery on interior and exterior of the Food Business.
- Incorrectly stored items in roof void.
- Inappropriate vegetation – e.g. long grass or flowering plants.
- Overhanging trees.
- Incorrectly storing pallets.
- Incorrectly storing foodstuffs on the exterior.
- Canopies, verandas and roof spaces.
- Drains and sumps – both internal and external

If necessary, the Food Business management should approach the neighbouring properties if the property provides harborage for Pests that could impact on the Food Business.

Food Sources

Elimination of food sources for Pests is a standard component of IPM. Not only does this discourage increases in Pest populations but will also increase the success of baiting programs where these are used.

A high level of cleanliness is a necessary start. Not only does lack of cleanliness afford food sources for Pests, it can lead to poor hygiene and increases odours attractive to pests and the risk of bacteria and other food contaminants.

Specific steps can include

- Removing pools of water remaining on the floor of production areas and amenities after the cleaning operation to provide a dry environment.
- Cleaning of the Food Business lunchroom on a regular basis.
- Routine cleaning of amenities and personnel lockers.
- Routine cleaning under product pallets held in stores/warehousing areas.
- Routine cleaning of drains and sumps
- Securing/taping or otherwise securing broken packages or cartons holding ingredients, food product and product wrapping materials and immediately cleaning up any spilt food source.
- Having lidded refuse bins on concrete slabs with regular housekeeping procedures in place.
- Hauling waste material in watertight trailers that do not spill contents.
- Spills contained and cleaned up without delay.
- Not holding waste material on surfaces that cannot be cleaned effectively.
- Routine maintenance and immediate repair of faulty, leaking or broken production and packaging machinery, conveyor belts, etc.

Pesticides and Traps

In most situations, even when all the above steps are in place, additional actions will need to be taken to eliminate Pests. The use of pesticides, baits and/or traps will be necessary. The type to be used will be Pest specific. Sections 12 and 15 have more information on the methods and equipment to be used.

As a general comment, it is unwise to rely on the one type of pesticide, bait or trap. Insects develop resistance and rodents develop trap shyness and bait aversion. A good IPM plan will use a range of methods and technologies to eliminate the pests and vary the time and location of use.

Improvement Program

Systematic recording of the components of IPM and the results can assist to develop more effective Pest Management. It should be based on trend analysis that allows identification of the Pest and location on the site. As noted above the Pest Manager should note in his reports to the Pest Management Contact those items outside his agreed scope of works but which impact on the IPM.

It is recommended these items should continue to be reported by the Pest Manager until they are addressed by the Food Business.

Work Health and Safety
The Pest Manager and Food Business must comply with all Work Health and Safety laws and relevant Codes of Practice.

The Food Business is obligated to ensure all Pest Managers are inducted safely onto their site.

The Pest Manager must identify hazards and manage risks that could affect the installation, maintenance and effectiveness of a Pest Management Program.

Pest Managers must develop and carry a generic Risk Assessment form. Prior to starting any work, the Pest Manager (PM) should conduct a risk assessment of areas to be treated and surrounding areas. If the slightest, potential risk or hazard is perceived/identified, the PM should complete the Risk Assessment form and then discuss this with the customer, along with the control measures both parties intend to put in place prior to the work beginning.

After the risks/hazards have been attended to, the Risk Assessment form must be completed and signed by the Pest Manager and the customer or site representative. Both parties should file a copy for future reference.

General Process Formula for IPM
The following process is provided as a 'Summary Process' to the actual step by step process of performing Integrated Pest Management. For the purpose of this CoP, this process is relevant to the handling of a pest outbreak within the confines of a food facility. However, this process can be applied to most Pest Management situations.

1 Inspect
2 Identify the pest
3 Find the source
4 Advise and educate the client
5 Modify the environment
6 Structure the Pest Management plan
7 Implement the Pest Management plan, and allocate responsibilities to both parties
8 Monitor, review and where necessary, improve the control plan
9 Continually record and document

12.2 Developing an IPM Program

The Integrated Pest Management Program is the risk management based for managing Pests, designed by the Pest Manager in conjunction with the Food Business. The IPM Program should support the Food Safety Program of the Food Business and should consider all legislative requirements and Industry Best Practices.

N.B. The Integrated Pest Management Program really comprises all formally documented pest related processes and procedures conducted and managed by both the Pest Service Company and the Food Business. It includes the policies, pest management and monitoring methods and technologies, communication and meetings, reporting and documentation, review and audits, along with quarantine, sanitation, housekeeping and maintenance of the arrangement between the pest manager and the food business. It is the 'Master Plan'.

The actual pest servicing specifications and requirements of the IPM Program can be detailed into a Scope of Works (specific to that site) and the Safe Work Practices or Standard Operating Procedures for that food site (these are really separate components of, but together, form the IPM Program.

Setting Objectives

The Food Business and the Pest Manager should agree on the objectives of the IPM Program. This is undertaken by both parties after the initial inspection. The IPM Program should be both pro-active/preventative and reactive.

Service Intervals

Because of the variability of Pest Management as influenced by pest species, conditions, seasons, location, site and other factors such as industry standard requirements and supplier agreements. the frequency of service can only be established and varied when required by the initial and ongoing risk assessments and by reviewing ongoing reporting and trend, which takes these factors into account. Accordingly, this Code does not specify frequency of services.

The Process

Step 1. Complete Initial Site Risk Analysis

This is the process of surveying the food site and documenting the risks and what's needed to manage those risks to the business and product (in this case food) from the business itself, pests and the pest management procedures.

The information gathered from this risk analysis should include risks from operational and environmental situations, the pests which pose the most threat, the likely sources and routes of entry of those pests and ultimately identify the processes and controls which can be implemented by the pest manager and the food business to avoid or minimise those risks. The data to gather for the Risk Analysis includes:

Step 1.1 Identifying Areas of Requirement for Pest Management

As part of the Risk Analysis process, the Pest Manager should complete a thorough site inspection identifying and documenting all past, present and potential pest activity, and appropriate IPM procedures required to safely but effectively manage all pest species which pose a threat to the specific food business. These are likely to differ from site to site, and as such, the IPM Program should be 'tailor made' to the individual business and associated conditions and requirements.

The Food Business should advise the Pest Manager of any issues which may impede or disrupt regular pest management activities

External Areas: The Pest Manager should survey the building surrounds, taking in all areas from the perimeter fences to the building fabric for potential harborage sites, evidence of pests and conditions that attract them, including:

Area 1	Neighbours
Area 2	Perimeter Fence Line
Area 3	Old equipment and empty drums
Area 4	Pallet stacks
Area 5	Garbage Areas including rubbish compactors and bins
Area 6	Plant Rooms and Waste Treatment Works
Area 7	Exterior Building Perimeter and Outer buildings and grounds

Internal Areas: Once the Pest Manager has completed the risk analysis of external areas, he/she should then do likewise through the internal areas and obviously, the 'heart' of the operation.

The relevant internal areas include but are not limited to the following:

Area 1	Incoming Goods/Receivables
Area 2	Quarantine Area

Area 3 Bulk Commodity Storage
Area 4 Production, Process areas
Area 5 Quality Assurance Lab and Office
Area 6 Packaging and service corridors
Area 7 Warehouse, Storage areas (including incoming and finished goods)
Area 8 Voids – roof, sub-floor, service ducts
Area 9 Maintenance/Engineering
Area 10 Administration, Staff food areas and amenities (including locker rooms and uniform store)
Area 11 Plant rooms, utility rooms and Cleaning/House-keeping
Area 12 Any internal waste area

Step 1.2. Identify Pests and Treatment Recommendations
The Pest Manager should identify the targeted pests, along with options for prevention, monitoring and control and make recommendations for the areas. Refer to Section 15 – Targeted Pests and Control Options for details

Based on the information gathered from the Initial Site Risk Analysis, the blueprint or framework for what the Pest Service Company provides to the Food Site in the way of a Scope of Works or 'Pest Service Schedule' can then be developed and documented.

Creating the Scope of Works is often only practical after the contract is signed, when full access is provided to all areas of the facility and to all historical pest files in order to structure the schedule appropriately.

Pest Monitoring and Management Stations
Pest Management Stations may target rodents, flies, cockroaches, stored product and other pests.

Where any risk of food contamination or other adverse consequences may exist, all Pest Management Stations must be durable, tamper resistant, secured firmly and the bait fully contained.

Stations should be uniquely recorded by location and number on a Pest Management Station site map.

Step 1.3. Identify Chemicals to be used on site
The need for Pesticides Even with thorough housekeeping, maintenance, sanitation and proofing procedures in place and the latest surveillance and monitoring technologies being deployed, pesticides and baits which are pest specific are often still required to eliminate troublesome pests.

In general, it is unwise to rely on the one pesticide, or one type of bait or trap. Insects may develop chemical resistance and rodents develop trap shyness and bait aversion. A good IPM plan incorporates a range of methods and technologies. Pesticides are an integral part even though the object is to minimise their use.

Toxic baits should not normally be used as the default inside food premises as they present a food safety hazard which is often unjustified. Instead, non-toxic monitoring blocks, snap traps and/or live catch traps can be used inside food businesses for rodent management within the IPM Program.

Every chemical/pesticide the pest manager uses on site must be approved by and registered with the APVMA (or equivalent) to use in food handling premises.

And there must be a formal documented list of these chosen chemicals for each individual food site. The list must be discussed and agreed upon by both the Pest Manager and the Food Business.

Many Food Safety Management Standards mandate a formally documented Approved Chemical List. It is the Pest Manager's responsibility to compile this list based on the safety, efficacy and compliance of each product and provide it to the Food Business.

Selecting a Pesticide

If a Pesticide is required for control of a Pest, the Pest Manager will need to select a pesticide formulation that will not adversely impact the Food Businesses workplace environment or safety and suitability of their product. The active constituent that kills the pest (the "pesticide") can be formulated in various ways; for example; a dust, liquid spray, solid, gel or liquid bait. It is common for the same active to be formulated in several ways and the one selected will depend on the pest and the specific situation.

Australia and New Zealand each have national regulatory authorities that are responsible for approving registration of pesticides, the formulations and their use.

These are:

- Australia – the Australian Pesticides and Veterinary Medicines Authority (APVMA)
- New Zealand – the Environmental Protection Authority (EPA) and Agricultural compounds and veterinary medicines (ACVM)

Both bodies, referenced above, approve all pesticide formulations and the application, including usage rates, the situation and the Pest. In some situations listed, inside or outside usage may also be clarified and approved. These details are noted on the product label.

The approved use on the label is legally binding and so-called "off-label" use can only be allowed with a permit. Permits can be obtained from either the national or state authority, depending on the circumstances. Copies of labels can be accessed via the web either on the national regulator site or the individual manufacturers' sites. **It should be noted that labels can be specific to the region of use as well as other details of use.**

As well as the Pest and the application situation, the following need to be considered when choosing a pesticide formulation:

- A minimum requirement is that it is approved for that application by the national authority.
- In some instances, other regulatory bodies may also have jurisdiction, for example; DAWE in Australia and MPI in New Zealand.
- End user requirements or the Food Business standards i.e.:
- Food Safety Program
- Food Business Accreditations
- IPM Program
- Approved Chemical List
- If there is a need to change the pesticide to avoid resistance developing in the pest population.

A documented risk assessment should be prepared before a pesticide is applied. Sources of information on the pesticide are the manufacturers label and the SDS. It needs to be recognised that the SDS is prepared for the product as supplied by the manufacturer and the risks will change, (usually reduced), when the product is prepared for use.

Formulations such as dusts and pelletised or liquid baits should not be used in food production and processing areas because of the potential transference to food product. Pesticides should be applied according to label directions and in a precise manner to avoid contamination of food or accidental coverage of non-targeted areas. Many pesticides are formulated so that this risk is negligible, for example; cockroach gels (although gels have usage limitations).

Rodenticides must be used in a bait block formulation. Bait blocks must be securely fixed inside (e.g. on metal rods) tamper-resistant bait stations that are anchored except when used for baiting in secure or locked areas, inaccessible voids, or sewer lines; outdoor bait stations must be weather-proof.

Step 1.4. Identify Resources

Both parties' organisations should identify resources that will be needed to meet the treatment specifications identified in Step 1. 2.

Note: it is not necessarily the case that all recommendations will be carried out by the Pest Manager. Many aspects of IPM are GMP related and will be controlled by the Food Business (e.g. Waste management, cleanliness, door operation).

Resources will include: personnel, processes, systems, technology, tools, information systems and decision making processes. The frequency and level of service from the Pest Manager should be agreed. Appropriate record keeping and information flow should also be identified.

Step 1.5 Identify Responsibility

The Pest Management Program should identify responsible persons in both organisations to maintain the Pest Management Program and liaise with each other. See Section 12.1 'What is Integrated Pest Management?'

Step 1.6 Ensuring compliance with site WHS requirements

The Pest Manager must confer with the Food Business to ensure that all elements of the IPM Program comply with site WHS requirements

Step 1.7 Identify Communications and Reporting Mechanism

The IPM Program will identify the supporting documentation the Pest Manager will prepare, retain and /or give to the Food Business. This will be agreed in consultation with the Food Business.

Step 1.8 Identify process for Reviewing and Evaluation of the IPM Program

Both parties must agree on a process and frequency for monitoring, reviewing, and if necessary, adjustments to improve the Pest Management Program. Trend Analyses will help with this.

Step 2 Develop Scope of Works

This is the blueprint or framework for what the Pest Service Company provides to the Food Site in the way of pest services. Similar to Service Proposals, Scopes of Work or Service Schedules can vary in layout and format. Some versions are generated by software. So there is really no 'standard format. It can be a SUMMARY or a DETAILED REFERENCE. Either way, it should at least include the following:

- Pests monitored and treated
- Areas covered
- Frequency of service and time of service
- Pest Management methods and strategies
- Pest monitoring techniques and technologies with frequency
- Approved products and chemicals

- Meeting schedule
- Reporting techniques and types (what reports and what they contain – electronic or hard copy reporting)
- Site surveys and Auditing frequency
- Review and Continual Improvement Process

The development of the pest service schedule is often only practical after the contract is signed, when full access is provided to all areas of the facility and to all historical pest files in order to structure the schedule appropriately.

The excerpt below is meant as informative guidance only for the FOOD SITE and is taken from-

Appendix 7: SAFE FOOD AUSTRALIA 3rd Edition 'A Guide to the Food Safety Standards' Nov. 2016 –

Chapter 3 of AUSTRALIA NEW ZEALAND FOOD STANDARDS CODE states:

A good pest management plan will ensure that food and food contact surfaces are protected from contamination by pests. It will also help food businesses demonstrate that they are taking all practicable measures to eradicate and prevent the harbourage of pests (under Standard 3.2.2 clause 24).

A pest management plan (Scope of Works) should consider the following factors:

- What pests are to be treated: Common pests are rodents (e.g. rats, mice), insects (e.g. cockroaches, flies, ants, weevils) and birds (e.g. pigeons).

- What areas are to be inspected and treated: Pests are generally attracted to water, food and shelter in dark places. Common pest hiding places include under and behind appliances and equipment, under washing facilities, inside wall cavities and cupboards, under and inside boxes and packaging. It may be useful to have a checklist of areas to inspect.

- The types of treatment to be used (e.g. baits, sprays, traps, etc.): Include safety and shelf-life information on the chemicals used, ensuring that chemicals are suitable and approved for use in food premises.

- Locations of Pest Management devices (such as rat bait stations, insect attractants, zappers, spray dispensers, flyscreens) and of pesticide storage: Ensure they are placed in areas that minimise the risk of pesticides or killed pests coming in contact with food or food contact surfaces (e.g. do not place ultraviolet insect killers directly above food preparation or packaging areas). It may be useful to draw up a site map marking the locations of Pest Management devices and storage areas.

- The frequency of inspections and pest treatment: The frequency and timing will depend on individual circumstances, such as the premises' location, climate, type of food, type of pest, season and signs of pest activity (droppings, fur, etc.). Inspections and treatments should occur regularly and often enough to ensure chemicals are not used beyond expiration dates, used baits and traps are replaced or reset, and killed pests are removed, so that the premises and vehicles remain free from pests.

- Hiring a professional pest manager is not a requirement in some food businesses, but it is strongly recommended to have a professional visit the premises regularly as they must meet relevant legislative requirements.

Ensuring the food premises and food transport vehicles are kept clean, tidy and well maintained will also help prevent problems with pests. Measures to prevent the entry and nesting/breeding of pests include keeping food and equipment off the floor, storing food and waste in sealed containers, promptly disposing of rubbish and regularly checking pest-prone hiding areas such as behind equipment, under sinks and so on.

See also Standard 3.2.2 clause 24 and Jurisdictional websites in Resources and References.

Written reports of any pest inspections and eradication treatments (conducted by the business or a professional Pest Manager) are useful documents to keep, including details on dates of inspections and treatments, any pest activity observed, chemicals/controls used and recommended remedial actions. Ensure that any recommended actions are seen to as soon as practicable. If pests cannot be adequately controlled by the food business itself, a professional Pest Manager should be called in.

Step 3 Ensure Documented Pest Manager Procedures are in place

3.a Pest Company Hygiene Procedures

Pest Managers are expected to maintain a high level of personal hygiene and cleanliness, they must not be carrying disease or suffering from any contagious illness and shall not pose any contamination risk to food.

All Pest Managers must be aware of specific requirements relating to GMP, personal hygiene and disease control when entering a Food Business. Different food companies may have implemented their own individual tailored Personal Hygiene procedures and/or policy. Check with the site contact regarding specific requirements and regulations.

Pest Managers should develop and provide to the customer, their own Personal Hygiene Policy for servicing food sites (which can be part of the Pest Manager's SOP or SWP for Pest Management servicing of food sites). Some of the important elements of that policy should include the following:

Correct Attire

- Exposed skin to be covered
- Suitable fully enclosed footwear to be worn
- Hair netting to be worn (covering all hair)
- Beard netting to be worn where applicable
- Coveralls or long sleeved dust coats to be worn and buttoned up
- Gloves where specified must be worn
- Protective eyewear where specified must be worn
- Protective hearing items where specified must be worn
- Jewellery (watches, rings, watches, necklaces, earrings, etc.) to be removed

Personal Hygiene

- Long hair must be tied up or tied back
- Hands to be thoroughly washed with soap, water and disinfectant where applicable
- Open wounds must be completely covered / bandaged (air tight and metal detectable)
- Ensure shoes are clean before entry. Use footwear exchange where required.
- Pest Company personnel suffering from a food borne illness (Diarrhea, Vomiting, Fever, Hepatitis or any other communicable disease) should not enter the food premises. In particular, the food production/packaging areas and should not begin any work. Pest Company personnel should also notify his or her office asap to enable management to either allocate

the service to another technician or re-schedule the service to a later date if possible. The type of illness or communicable disease will determine what actions are to be taken.

The Pest Company Management will inform and liaise with the food site management to decide on an alternative arrangement for servicing of the site.

Pest Technicians should also contact their management if suffering from a severe cold or influenza. Management will then decide whether the technician should attend the site.

3.b Safe Chemical Handling and Environmental Procedures for the Pest Service Company

The Pest Manager should also develop and provide to the customer a Safe Chemical Handling Procedure or Safe Work Practice for Chemical Handling or similar for servicing food sites, which can be part of the Pest Manager's SOP or SWP for Pest Management servicing of food sites.

Pest Managers shall adopt responsible work practices which reflect relevant Acts

- Hazardous Substances Act and Health Acts (Australia);
- Hazardous and New Organisms Act and Health and Safety at Work (Hazardous Substances) Regulations 2017 (NZ), EPA (NZ) Hazardous Substances (Hazardous Property Controls) Notice 2017, and a Food Business's policy on the environment.

Examples of areas could include (but not be limited to);

- Always adhere to chemical product label directions and SDS's
- Storage of onsite chemicals.
- Environmental risk management process on all chemical preparation has been completed and authorised by the Food Business.
- Ensure all chemical spills are contained and cleaned up.
- Ensure all chemical containers are disposed of in accordance with labelling requirement and in accordance with the Hazardous Substance Act (Australia). Hazardous Substances and New Organisms Act 1996, Health and Safety at Work (Hazardous Substances) Regulations 2017 (NZ), EPA (NZ) Hazardous Substances (Hazardous Property Controls) Notice 2017.

- Dispose of all refuse, or recycle all plastic bait stations, batteries, cardboard etc. by removing to an appropriate site or as per local regulations.
- Do not dispose of any chemical residues or containers at customer sites.
- Use pesticides downhill of wells, sinkholes, ditches, or standing water.
- Identify and avoid streams, ponds, creeks and other watercourses.
- Do not apply pesticides when rain or winds could affect the treated area.
- Be mindful of adjacent properties with spray drift, i.e. pets, pet feeding containers and clothes lines.
- Triple-rinse spray equipment and empty containers after use.
- Properly dispose of rinse water or use during later pesticide application.

The Pest Manager should develop and provide to the customer a Safe Chemical Handling Procedure / Safe Work Practice for Chemical Handling or similar for servicing food sites (which can be part of the Pest Manager's SOP or SWP for Pest Management servicing of food sites).

This SOP or SWP document can be in the form of a multi-tiered written procedure which encompasses the pest company's policies like Chemical Handling, Personal Hygiene and Work Health and Safety, along with

the company's standard pest servicing procedures e.g.: Rodent Control, Crawling Insect Control, Flying Insect Control, Stored Product Pest Management , Bird Control, Feral Animal Control and so on.

An alternative can be individual SWP's or SOP's for each pest service and each policy separately. Either way, the food business should know what and how Pest Management servicing is performed on their site(s).

Step 4 Establish and agree on Food Site Specific Procedures

It is the responsibility of the Food Business to ensure the Pest Manager is inducted onto the site; this should include policy requirements for GMP (including hygiene), site security, WHS, and environment.

Specific GMP requirements for Food Businesses may vary and should include (but not be limited to) the following:

- Sign in and out procedures
- Designated parking areas
- Designated smoking areas
- Hand washing protocols
- Personal Hygiene requirements
- Eating and drinking restrictions within designated areas
- Prohibition of specific items in designated areas
- Fire/Emergency evacuation procedures and Muster Areas
- Working at Heights procedures
- Small Space procedures and permits
- Access to restricted area procedures
- Personal Protective Equipment requirements

All the above should form part of the site induction provided by the food site

Food Site Security Procedures
It is the responsibility of the Food Business to ensure any relevant security policies and procedures are communicated to and understood by the Pest Manager. Pest Managers are required to abide by security policies and procedures at Food Businesses.

In Australia, Pest Managers must always keep a copy of their current Pest Management Technician's Licence and identification on their person. In New Zealand Pest Managers must be qualified as an Urban Pest Management Contractor ("qualified UPM contractor") under the EPA Hazardous Substances (Hazardous Property Controls) Notice 2017, should keep a copy of their qualification with them or a copy of their current PMANZ technician registration certificate and PMANZ identification card on their person always.

Pest Managers are to supply the Food Business with a copy of identification documents for all staff members who may enter the site on behalf of the Pest Manager.

Attire for Pest Service staff at Food Business Sites
The Food Business may supply applicable protective attire for their manufacturing areas. Where this does not occur, it is the responsibility of the Pest Manager to comply with Food Business Food Safety Standards.

Pest Managers will need to comply with all hygiene, WHS, sanitation and bio-security measures in regards to protective clothing and equipment needed to enter the Food Business site.

Step 5 Develop the Pest Management Documents

Documentation or 'Data Recording' is a practical and mandatory component of food safety programs and IPM Programs. In this modern digital world, much information recording and exchange is done electronically (computers) as opposed to traditional hard copy printing.

The choice of what medium documents and info are kept in (hard copy or electronic) is really up to the food business and the pest manager to decide and agree on. Whatever the decision though, the data must be constantly updated, correct and be accessible at all times.

It is imperative that IPMP documents and records are accessible at all times to food business staff, pest mangers and auditors, so if there is a risk of these documents not being readily available due to internet outages, computer issues or where secured computers or servers cannot be accessed due to restrictive logins, then a Site Register should be seriously considered to store at least the most important documents and records.

Using a Site Register

Many of the food safety management systems require the use of a site register, which is a communication "tool" between the food business and the pest services company. It is a repository (folder, book, file) which is kept in an agreed location for storing paperwork/information relating to the IPM Program and delivery of Pest Management services to the food business.

The food business and the pest company in collaboration, should keep the site register up to date, although the main responsibility for this, rests with the Pest Manager.

There are many documents which can be stored in the site register. Documents may also be filed electronically and made available online. The choice of which documents are kept in the site register and which ones are recorded electronically is really up to the food business and the pest company to agree on.

Required documents vary according to the individual food business/site, pest services contract, specific food safety plan and food business certifications such as HACCP. Irrespective of this however, there are several documents which in general are universal requirements of several food safety management systems.

These include the following:

- Pest Services Company Contacts List - Names and numbers of key pest company personnel which the food business can contact when needed. The contacts at the food business can also be listed here. (Hard copy recommended – more easily accessible)

- Service Summary - An overview of which pests, where and how often service are conducted). Any special site conditions, access arrangements and restricted areas can also be included here (Hard copy recommended – more easily accessible)

- On-Site Communication Guidelines - Sign-in and sign-out procedures. (Hard copy recommended – more easily accessible)

- Customer or Staff Pest Sightings Log - For food site staff to record pest activity which can be addressed during service visits by the pest technician. (Hard copy recommended – much more practical as these can be in many locations and more easily accessible)

- Site Maps - Where the number and location of pest monitoring devices (rodent stations, UV light Units, Pheromone Lures, etc.) can be displayed. The pest manager or the food business should sign off the maps to confirm the information is current and correct, at regular intervals (usually 6 months). (Hard copy recommended – more easily accessible)

- Approved Chemical List - Agreed list of chemicals approved for the site. (Hard copy recommended – more easily accessible)

- Pest Monitoring Sheets - For pest technician to record species, numbers and level of activity e.g.: rodent stations / UV Flying Insect light units / Pheromone Lures. (Can be recorded online – new apps for handheld device recording)

- UV light Globe Change Log - Where the dates of the globe changes can be recorded to alert when the next change is due. (Can be recorded online)

- Safe Work Practices or Safe Operating Procedures – Written procedures detailing how specific pest services are performed e.g.: Servicing of rodent stations, UV light units, Cockroach Treatments, Spider Treatments, etc. (Can be recorded online)

- Pest Manager Licenses - Copies of the Pest Manager's licenses who perform the pest servicing. (Can be recorded online)

- Safety Data Sheets (SDS) - For all chemicals used on the site. (Can be recorded online)

- Insurance Certificates / Accreditations - For the pest services company. (Can be recorded online)
- Service Reports - Whether hard copy or electronic, Service Reports must be completed by the Pest Manager and signed (by both parties preferably) after each and every service/treatment (many are electronic these days)

About Client Customer Pest Sighting Logs

The Food Business should maintain an accurate record of pest sightings (including specimens where possible). Any sightings considered urgent should also be immediately communicated to the Pest Manager by the Food Business and recorded.

Any pest related customer complaint should be recorded in the Pest Sighting Log (depending upon type and size of business)

An example of important information to be included on the Client Pest Sighting Log

- Date
- Pest (if known)
- Specific Area
- Reported By
- Immediate Action Taken (e.g. Sample pest taken, maintenance contacted)
- Corrective Action by the Pest Manager
- Date Completed
- Pest Manager's name

The Client Pest Sightings Log must be checked and signed during each service by the Pest Service Technician, even if there is no reporting entered into the register by site staff. This serves as evidence that the Log has been checked by the pest service company as part of a regular service.

About Service Reports (necessary contents)
Service Reports serve as Records of Pesticide Application (conforming to various state and territory Pesticide Regulations) and as 'Proof of Service'.

Service Reports should include the following:

- Client Name
- Site Address
- Date of Service
- Pests treated
- Areas covered
- Level and location of pest activity and species responsible
- Products used to treat that activity and where
- Prevailing weather conditions (wind direction and speed)
- Pest Management Program improvement recommendations
- Any other legislative requirements
- Technician's Name and signature
- Provision for customer signature

All service reports will need to be supplied to the representative of the Food Business within the agreed time frame post service (as set out in the Scope of Works or Service Contract). It is recommended that service report records are kept for a minimum of 5 years, but also refer to State and Territory requirements.

Pesticides and Chemical Batch Numbers
Recording of Pesticides batch numbers on service reports may be necessary under the Food Safety Programs of specific sites. This recording mechanism allows the Pest Manager to trace the location of the Pesticide batch usage if required upon recall, which adequately facilitates auditing requirements. Records of Pesticide Application are required by legislation and in some states, need to be completed and provided to the customer within 24 hours e.g.: NSW Pesticides Regulations 2017.

About Trend Analysis
Trend Analysis is a continuous improvement planning and risk management tool. However, It is not a substitute for a proactive program based on a pest risk assessment and designed accordingly, but it is now common on many food manufacturing sites and reflects the influence of quality management and third party auditing.

Trend Analysis is also a measurement tool which can provide insight as to the effectiveness or otherwise of a pest management program. Trend Analyses give us historical records of pest activity over specific timeframes and for specific areas which can help with predicting future pest activity and preparing for it.

The form of the trend analysis needs to be agreed on between the Pest Manager and the Food Business. Many Pest Managers have their own system that is supported by their own training, experience and

equipment. However, the Food Business may have its own corporate requirements or those of an auditing regime.

Trend Analyses reports are not usually required as 'everyday' records to be made available for view in Site Registers or in electronic form, but auditors will request them as they are integral tools for measuring IPMP effectiveness and for certification.

Data used in a trend analysis will depend on the Pest(s) and what information is required about that pest(s).

Some examples of data sources for trend analyses are:

- Client Pest Sightings Logs
- Pest Monitoring Logs (pest activity and bait consumption data from rodent stations and pheromone lures)
- Sticky boards for flying and crawling insects
- Catch traps
- Service Reports
- Product recalls
- Site Inspections and Audits
- Photography (where authorised)
- In all examples the identification of the data source, location, dates and/or time must be kept.

Pest sightings can be a useful source of data indicating a Pest and location. However as they are often based on casual observation and inconsistent reporting they can be an imprecise source of data. It is preferable that more formal and standardised data collection be used in the trend analysis.

The data needs to be collected and recorded in a way to allow "drill down" of broad information to location specific information. The bigger the site the more important this becomes.

The information (numbers and species) collected from the "Pest Monitoring Reports Logs" which are completed by the Pest Manager at each service visit e.g.: Rodent, Flying Insect, Stored Product Pest can be collated over defined periods of time, so that patterns of activity by pest species and/or in specific areas can be established.

These patterns can be then be used to evaluate the success of the pest program and/or to predict seasonal or operational effects (maintenance programs, bulk ingredient delivery, etc.) on pest activity in the future.

Reporting can be hard copy, electronic (disc or memory stick) or web based. It will be by agreement between the Pest Manager and the Food Business. It is recommended that verbal, face-to-face reporting in conjunction with the hard copy/electronic report be also done. The frequency of this most often depends on the level of Pest activity and the need to make changes on the site to reduce the Pest activity.

The Pest Managers report should include all aspects of Integrated Pest Management (refer to Section 11) that need to be addressed. Items that have been reported previously but not addressed should be repeated in subsequent re reports until they are addressed.

Pest management is an activity where success is indicated by a null result (e.g. the better it is the less is seen.). Therefore trend analysis showing low Pest activity should not be an automatic trigger to reduce the pest management effort. Reduction in the effort can lead to a Pest outbreak and the time and cost to

regain a satisfactory low level of Pest activity can be more than the saving from reducing the pest management effort.

About Location or "Site" Maps

Location or Site Maps are to be maintained documenting all types and locations of the uniquely identified (numbered) pest management devices/stations. Maps should be reviewed, dated and signed for currency and correctness at least annually.

13. Organic Food Business Sites Auditing, Evaluation and Continual Improvement

A Pest Manager completing works at an Organic Food Business site should apply this COP criterion and also provide further nonchemical approaches to Pest Management on an Organic Food Business site.

Some of the non-chemical approach may include:

- Mechanical and physical controls
- Horticulture controls

(Additional options for the various Pests can be found in Section 12.)

13.1. Philosophy

It is recognised that organic products provide an alternative for those consumers seeking food with little or no chemical residues.

Biodynamic and organic farming methods have evolved over many years through particular philosophical approaches to farming. These reasons generally include a concern about the environmental sustainability of farming and a desire to work with natural processes. Organic farming relies primarily on biological processes, rather than the purchase of chemical inputs, to maintain soil fertility and plant and animal health.

It is recognised that these systems of farming can contribute to the outcomes listed above and have therefore developed a Pest prevention or management strategies in support of organic farming.

How does Organic Certification affect Pest Service Delivery?

The most significant difference regarding pest management with Organic Certified food sites is the onerous restrictions on chemical selection and application methods.

The Pest Manager providing the Organic Pest Management Program will use or encourage the following measures in order of priority:

- Preventative methods to discourage and exclude Pests, such as sanitation, elimination of Pest habitat and denial of access to buildings.
- Approved mechanical, physical and biological methods.
- Permitted substances and treatments.

There shall never be direct or indirect contact between organic products and prohibited pesticides.

13.2 Certifying Organisations

The Organic Food Business needs to be explicit about the certifying standards they are following. The Pest Manager can then modify their efforts and their IPM Program to follow the state and country standards and programs recognized by the certification body or authority for the Organic Food Business.

The USDA National Organic Program (NOP) is a reference point that may be used. While all organic agents follow the same guideline, there may be different procedures in order to comply with the National Organic Program (NOP), Australian Organic Standard (AOS) 6.1.19 or the New Zealand Organic Standard of the New Zealand Food Safety Authority (NZFSA).

In Australia, organic certification is performed by several certifying bodies that are accredited by the Department of Agriculture, Fisheries and Forestry (DAFF), formerly the Australian Quarantine and Inspection Service (DAWE) under the National Standard for Organic and Biodynamic Produce.

The National Standard for Organic and Bio-Dynamic Produce was first implemented in 1992 as the Australian Export Standard for products labelled organic or biodynamic. A second edition was released in 1998.

Since inception, it has provided the organic industry with a nationally agreed Standard that is the default minimum standard by which all other proprietary organic standards must conform to in Australia. However, individual certifying organisations may stipulate additional requirements to those detailed in this standard.

Pest Management within Organic Certified environments cannot be done in the same manner it's done in other environments. It must be managed and conducted in specific ways to a specific standard(s) and it must be fully documented. For example:

Location or 'Site' Maps

A Location Map of each facility should be created, showing all pest management devices, and kept in the Service Register. The Location Map will document location and number of all devices including bait stations, interior traps, pheromone monitors and Insect Light Traps (ILT). The diagram needs to be updated annually 6 monthly or whenever the location or the amount of the pest management devices change.

13.2 The use of Rodenticides

Rodenticides must be located outside the processing area and only used where other methods have proved ineffective. Containers must be positioned so that there is no potential for contamination with products complying with this Standard. Containers must be inspected regularly and dead rodents removed. The operator must maintain records on volume and use of rodenticides

13.3 External Rodent Program

The Pest Manager will install and maintain exterior approved bait/monitoring stations as specified by the scope of works. All stations will be locked and secured, serviced as specified by the scope of works, and will be dated when checked. A log will be established in which to note conditions found in the bait stations at the time of service. Accurate record keeping is important for future review of actions taken or recommended and is a requirement of food safety standards and certification audits.

All stations will be recorded on the Location/Site Map. If rodenticide is to be used it must comply with the certification standard. If necessary, permission should be obtained from the certifying agent before using rodenticide.

13.4 Internal Rodent Program

The Pest Manager will install and maintain interior traps/monitoring devices as specified by the scope of works All traps will be dated when checked. Conditions found in the traps at the time of service will be noted on log sheets and electronic reporting software. If rodent activity increases, then the number of stations may be increased to resolve the problem.

Changes will be noted on a revised Location/Site Map which must be dated. If the problem is brought under control and a decision is made to reduce the number of stations, a new Location/Site Map should be created. An inspection should be completed to identify why the problem occurred and findings and recommendations documented in a report that can be used to potentially avoid a repeat of the problem.

The Rodent Program should be written into the site specific IPM Program in the form of a Safe Work Practice document as required by most Food Safety Standards

13.5 Insect Control

Pest Management in an Organic Food Business shall preferably be obtained by non-pesticide means such as:

- Removal of Pest habitat, food sources and harbourage sites.
- Prevent Pests from entering the building (exclusion and inspection of receivables).
- Make recommendations to modify environmental factors such as lighting, humidity, temperature and air pressure to reduce activity.

(Refer to Section 16 for specific actions for the different types of Pests.)

If the above do not achieve the required result, pesticides may have to be used. Before they are used, the Pest Manager in consultation with the Food Business should obtain written approval from the certifying agent.

The Insect Program should be written into the site specific IPM Program in the form of a Safe Work Practice document as required by most Food Safety Standards

External and Internal Treatments

The Pest Manager will conduct a thorough inspection each visit and look for conditions that are conducive to an infestation. All recommendations should be documented on the service report. Pesticides will not be used until other options have been tried. If Pesticides are to be used, only those on the approved list of the certifying organisation shall be used. Pesticides must not come in contact with food, packages, or food contact surfaces.

13.6 Fly Program

Most of the flying insect management tools listed in Section 12.2 are appropriate for use in Organic Food Businesses. However, management tools involving insecticides may not be used except under extreme circumstances and then only after consultation with the Organic Food Business and with their written permission.

Fly management tools will be specified in the scope of works and where appropriate, their positions, indicated on the location/site map. For Insect Light Traps (ILT), dates of light tube and adhesive board replacement will be recorded on the trap when replaced and the ILT log sheets will record insects caught in the traps at the time of service. The Fly Program should be written into the site specific IPM Program in the form of a Safe Work Practice document as required by most Food Safety Standards

13.7 Stored Product Insects

The Pest Manager will utilize Stored Product Insects (SPI) Monitors as specified by the scope of work. The Pest Manager will recommend corrective actions based on SPI activity found during the service of pheromone monitors. All non-pesticide solutions to eliminate infestations must be initiated first. The certifying agent must approve Pesticides to be used.

13.8 Required Documentation for Organic Sites

The following information must be kept in the service register or electronically for review and be available at all times:

- State certification/licence
- Business insurance
- Scope of Work (SOW)
- Frequency of servicing - if not specified in the SOW
- Client Pest Sightings Log
- Equipment log sheets
- Location/Site Map
- SDS and labels (electronic or hard copies as appropriate)
- Service Reports clearly indicating the target pest, location of pest activity, methods and products used and amounts and all recommendations.
- Summary of Actions and Recommendations worksheet (see below).
- Request to use a product not on the National List, or as required.
- List of Approved Products

The Summary of Actions and Recommendations should be prepared in a way for the certifying organisation to easily see the success or failure of non-pesticide treatments, and if there is a failure, the clear reasons to allow the use of approved pesticides.

This would normally contain;

- The specific actions and methods used so far.
- The dates the actions and methods were completed.
- The specific action item(s) envisaged if using pesticides permitted
- Estimated duration/timeframes of pesticide use where permitted.
- Identify whether the Food Business or Pest Manager is to carry out each actions.
- Result of the action – (see Trend Analysis in Section 10 for more information).
- Special comments

13.9 Steps if Pesticide Use is Requested

If non-pesticide methods have been tried and the pest problem persists the use of a pesticide may be justified. Good documentation as outlined above will be necessary if this decision is taken.

- If the problem persists, you may use a product on the NOP approved list taking care not to contaminate any organic product or contact surface. You do not need permission to use a product on the NOP approved list. However, you must first document that your attempts at control were unsuccessful utilizing non-pesticide procedures.
  Check if an approved pesticide can be used without permission.
- A Summary of Actions and Recommendations should be prepared after using the pesticide.
- If the approved pesticide does not achieve the desired result it will be necessary to use a non-approved substance.

- An application for use of a non-approved substance should be prepared and submitted by the Food Business to the certifying organisation. An outline of previous actions and results should accompany this application.

Information required in the Non-Approved Pesticide Use application:

- Pest species
- Pesticide name, Chemical Class, EPA Reg. #, Concentration.
- Quantity of product to be used.
- Area measurement to be treated.
- Application methods.
- Description of steps already taken to this point.
- Description of the area to be treated and a diagram.

Once permission to use a non-approved pesticide has been received, the following should be done;

- Strictly follow the Product Label directions for use and Product SDS.
- All food and containers are removed from the area.
- Doors and entry points into the treatment area are closed.
- Use plastic sheeting where necessary to prevent drift.
- Treat and release the area back to the facility.
- Document the service and place the service report in the service register.
- Clean all areas that may have come into contact with the Pesticide spray or drift.
- Return the food items to the area.

Organic Food Certification Standards vary but in general are well aligned. Basic essentials include:

- Follow the same processes as you would in a food handling business but;
- Read and adhere to the specific standard for that specific client/site
- Pay particular attention to what can be used and how to use it
- Always conduct a risk assessment prior to all work beginning
- Record and document everything

14. AUDITING EVALUATION and CONTINUAL IMPROVEMENT

Key Performance Indicators for measuring the effectiveness of the IPM Program

Due to the ongoing and challenging problem of controlling Pest activity in a food handling environment, it can be difficult to verify the complete effectiveness of an IPM Management Program.

The success of an IPM Management Program can be measured by ongoing continuous improvement identified in time frames and by applying the following KPI's:

- A measurable reduction of Pest activity. The means of measuring to be agreed by the Pest Manager and Food Business.

- Pest Managers are appropriately licenced and a copy of licence is available in records of service documents.

- Service is completed in accordance with service frequency.

- All products used have accompanying current Labels and SDS's.

- All products used are approved and registered for purpose.
- All physical equipment complies (e.g. Shatterproof UV light tubes, lockable bait rodent stations).
- Non-conformances by the Pest Manager company are addressed within a pre-determined timeframe.
- Non-conformances by the Food Business are addressed within a pre-determined time frame.
- A detailed service report (consistent with the requirements of the relevant Pesticides Legislation i.e.: inclusive of a 'Record of Pesticide Application') for each chemical application and site visit is produced and a copy is stored in the Site Service Register or made readily available to the customer online.
- Pests and areas covered in the Scope of Works (SOW) are inspected and where appropriate, treated accordingly. This information is to form part of the service report (see above).
- SOW and service requirements are reviewed at least annually to ensure the program is meeting the pest management needs of the facility.
- A valid contract exists between the pest management service provider and the Food Business outlining the SOW, service frequency, resolution times to non-conformance, reactive or emergency response times and any other relevant information.
- Regular meetings between the food business and pest company must be agreed upon and scheduled, to review and discuss the success or otherwise of the IPM Program and agree on changes and additions ongoing.
- The food business must arrange for periodical Site Inspections and Audits to be conducted on their product related production and operational procedures as well as the scope, quality and results of the pest company service delivery. Site Inspections and Audits can be provided by the pest services company or by a qualified third party auditor.
- If a Pest Management company intends to offer Site Inspections and Audits, the individuals conducting these must be qualified internal auditors by way of successful completion of an Internal Auditor's Course (preferably food safety systems based).

14.1. Site Inspections and Internal Audits (food business) explained

A 'Site Inspection' is a physical inspection of the Pest Management equipment, devices and methods used on the site, with observations and recommendations relevant to current pest activity/status, the actual Pest Management procedures and pest related risk mitigation on a food site.

This is different to an 'audit' which focuses on the pest services delivery at an office/administration level, reporting procedures and documentation provided to the food business.

Both these collective areas should be Inspection/audited regularly, which then means that between the two, most pest related aspects of a food business are reviewed and monitored regularly.

14.2 Objectives and Purpose of Site Inspections and Audits

The benefits of Site Inspections and Audits

From a pest related perspective, many processes within a Food Business can either have a beneficial or detrimental effect on the successful production of a food product, free from contamination. A Site Inspection and Audit may identify both or either of these factors.

Recommendations and associated actions resulting from a Site Inspection and Audit enables a food business to actively monitor, review and improve their food production processes and consequently minimise the risk of contamination (which will enhance the results when they are audited by independent auditors such as HACCP, AIB, BRC, etc.).

14.3 Aspects of the Food Business to audit include:

Incoming Goods	Inspection and Quarantine Area procedures
Grounds Maintenance	Reducing pest and vermin harbourage / attraction
Building Maintenance	Proofing/sealing of building against pest and vermin entry from outside.
Entry and Exit Maintenance	Prevention of pest entry through doorways, docks, etc.
Sanitation Program	Waste management/containment and recycling
Cleaning Regimen	Regular documented cleaning regimen
Production and packaging line maintenance	Reduction of food product spillage
Storage and Warehousing	Creating room for inspection, cleaning and treatment
Recording and documentation	Maintaining accurate records for review and audit Eg:- Documented programs for: • Cleaning and sanitation • Maintenance and proofing • Meeting and review schedule (with Pest Manager)

14.4 Aspects of the Pest Service Delivery (Pest Management Business) to audit include:

Pest Manager qualifications	Evidence pest managers are qualified and licensed
Site Service Register	Ensuring all documents are included and up to date or are readily available online
Site Inductions	Evidence pest managers completed site inductions
Hygiene Policy	Ensure pest business has Hygiene Policy in place
Written Work Practices	Ensure pest business has dedicated safe work practices for all pest service procedures and treatments performed on site and the practices conform to WHS legislation

Pest Status of Site	Review and assess the level of current pest activity (from inspection and review of reports in site register and/or online reporting.
Approved Chemicals	Ensure there is an Approved Chemical List and that all chemicals listed are registered for the intended purpose.
Equipment and Devices	Ensure devices are installed securely, numbered, labelled and accurately reflected on the site map.
Training Records	Ensure there are written and signed staff training records of regular training, not forgetting new staff.
Recording and Documentation **(Rodent Stations/UVLights /pheromone lures, etc)**	Ensure all records, reports, trend analysis, pest sighting reports, pest monitoring logs, etc are retained, accessible and up to date. Reporting documentation can be in the form of hard copy of be made accessible online/electronically (or a combination of the two). There are some documents/reports which for practical reasons, should be in hard copy in the site service register, as opposed to electronic access.

15. TARGETED PESTS and MANAGEMENT METHODS

15.1. Rodents

Background

Rodents have been implicated in over 55 diseases representing a diverse range of pathogens from viruses to parasitic worms. Rodents are also responsible for a considerable loss of food supply by consumption and contamination. Damage to building fabric, fires, outages and damage to computer, telecommunication and electrical networks and damage to personal effects are among other consequences caused by rodent activity including gnawing.

The roof rat is the most predominant rodent species in Australasia urban areas and the mouse is the most predominant pest in our agricultural regions.

Diseases associated with rodents include:

- Salmonella – Bacteria affecting digestive system (can be fatal).
- Weil's disease / Leptospirosis – relatively rare bacterial infection – symptoms include abdominal pain, diarrhoea, rashes. Can lead to liver damage, renal failure and possible death (from rodent urine).
- Trichinosis – Bacteria causes headaches, fever, chills, vomiting, aches (infectious worms).

- Murine Typhus – Rickettsia bacteria from rat flea causes headaches, fever, chills, vomiting, and aches. Can be fatal.
- Rat bite fever – If untreated, can cause damage to heart and brain. Can be fatal.
- Lymphocytic chorio-meningitus – Worms penetrate the body and infect the membranes around the brain and spinal cord.
- Poliomyelitis – Highly infectious viral disease. Causes paralysis, which is often permanent.
- The "Black Plague" or Bubonic Plague which killed 50 million people throughout Europe in the 15th century was a pathogen transmitted via a bite from the rat flea.
- More recently, the discovery of the Hantavirus Pulmonary Syndrome (a potentially fatal disease which affects the circulation, lungs, spleen and gall bladder) associated with some rodents continues to be of concern to medical authorities and should be a stark reminder of the connection between rodents and serious disease.

Rodent Pest Species

The rodents of concern as pests are mice and rats. Following are some facts that are useful to know for the understanding of control options.

These behaviours are common to all three commensal rodents:

- Rapid breeding cycles
- Extremely adaptable to their surrounds
- Cohabitate easily with humans
- Excellent route memory
- Excellent senses except for vision
- Good at climbing and jumping
- Excellent swimmers
- Nocturnal animals
- Omnivorous (will eat almost anything)

House Mouse - Mus musculus/domesticus

The House Mouse has the most extensive distribution of any pest mammal throughout the world. In Australasia, mice have established throughout the entire region and are found in areas where no native mammals are present. Mice have a range of behaviours that facilitate invasion and quick establishment.

These behaviours allow mice to maintain population sizes at high numbers and even reach plague proportions.

Varying food intake, modifying diet depending on what is available, varying breeding rates and modifying nesting behaviour are some of the adaptations which allow mice to invade areas quickly.

When attempting to control mice it is imperative that control measures commence prior to breeding otherwise many small satellite populations can develop quickly and mice numbers can grow rapidly.

General Behaviour

- Mice are good climbers, however they do not move between elevated and low lying areas to the same extent as Roof Rats.
- Mice often nest in tight concealed corners, in grain and stock bags and in makeshift nests formed from available materials.
- Mice are curious and will investigate new features within their environment.

- Mice are very efficient burrowers, however burrow systems are not as extensive as Roof Rats and Norway Rat burrows.
- Mice burrows are relatively shallow with only a few entry or exit points.
- Mice have a low requirement for water.
- Mice are good swimmers, climbers and jumpers.
- Mice can jump vertically to a height of approx. 60 cm
- Mice are able to enter through gaps as small as 6mm.

Roof Rat – Rattus rattus (also known as the Black Rat or the Ship Rat)
The Roof Rat is one of the most successful and widespread rat species around the world. In Australasia, Roof Rats have become significant pests in both urban and agricultural environments and, unlike most other parts of the world, have a larger distribution than Norway Rats.

The ability of this species to utilise an entire area (low lying and elevated) due to their agility, to modify their breeding rate and live in colonies or independently, allows this species to flourish in many environments. Roof Rats reproduce throughout the year, however peak breeding is usually associated with warmer summer months, when food is plentiful.

General Behaviour
- Roof Rats are agile climbers and this forms an integral component of their feeding behaviour.
- Its ability to climb allows them to utilise food and nest sites unavailable to other animals.
- Climbing also allows them to avoid predators.
- Roof Rats are very accomplished burrowers, forming extensive burrow systems, but prefer to live at heights.
- Roof Rats are neophobic (fear of anything new or unfamiliar).

Norway Rat – Rattus norvegicus (also known as the Brown Rat or the Sewer Rat)
The Norway Rat is the largest and most aggressive of the commensal rodent species. This species has colonised and established well in urban areas, particularly refuse sites, wharfs, food production areas and sewerage systems.

The Norway Rat's aggressive nature, wide ranging diet, ability to feed on scraps and waste products, burrowing behaviour and rapid breeding rate make this species an accomplished pest.

General Behaviour
- Norway Rats are creatures of habit.
- They are very neophobic (fear of anything new or unfamiliar).
- They are excellent swimmers.
- Norway Rats often form extensive burrow systems with multiple entry and exit points.
- Within structures, Norway Rats will nest in debris, wall voids, culverts, stock piles pipes etc.
- Norway Rats often inhabit areas of lower hygiene standards in comparison to Roof Rats.
- Norway Rats are poor climbers and are rarely found in elevated areas.
- Due to their aggressive nature, Norway Rats can often out-compete other rodent species allowing them to make better use of food and nests within an area.

Any program to control rodents should include exclusion and deterrence. Entry points need to be blocked and the area kept clean and free of food scraps. If possible, food storage should be off the ground – not because this prevents access, but it limits harbourage and undetected access.

However, even with the above systems in place rodents are still likely to gain access. Their physical capabilities mean total exclusion is almost impossible to achieve. Therefore any rodent control program will include additional steps as outlined below.

15.1.2 Rodent Management

The Rodenticide Approach
Before any baiting program commences, the Pest Manager must confirm that this is acceptable to the organisations' policy and government regulations covering that business activity.

For premises that come under the control of DAWE or MPI, baiting within designated areas of the building may be forbidden. HACCP standards/guidelines discourage the use of rodent bait in the food preparation, production and packaging areas of a food handling business.

Some organisations' own policies do not allow the use of bait due to the risk of potential problems arising from rodent carcasses being non-retrievable, and accidental or deliberate contamination of their products from baits. Note also that non-retrievable rodent carcasses may provide breeding sites for blowflies.

The majority of rodent baits are anticoagulants. While a rodent will usually consume sufficient in one feed to be a lethal dose, death usually takes several days. This is a distinct advantage, which permits an antidote (Vitamin K) to be administered if a non-target species consumes the bait and also reduces the incidence of bait shyness by disassociation of the consumption with illness. The consumption of bait by non-target species is regarded by the Pest Management Industry as a consequence of poor placement of bait. Good pest management practice will be considered when placing the bait. Bait effectiveness will be compromised if there is a plentiful supply of other food sources.

Baiting provides a dual role of monitoring and has also proven to be a reliable and effective control method. It can be used in conjunction with other methods.

Placement of Rodent Bait Stations
Positioning of rodent bait stations at Food Business premises should be at the Pest Manager's informed discretion based on a risk assessment that considers the following factors:

- Label instructions on the product
- Type of area (perimeter, external grounds, outbuildings, store rooms, plant rooms, subfloors, roof voids or finished goods storage areas).
- Neighbouring environment and/or type of business adjacent to the Food Business.
- IPM processes in place at Food Business facility.
- Rodent numbers (if any).
- Rodent harbourage and breeding site areas within Food Business facility areas.
- Building design and fittings.
- Other rodent control methods used (e.g. snap traps/glue boards/live capture).
- Availability of other food sources in area.
- Type and species of rodent.
- Access by non-target animals.
- Adherence to the site food safety management system

For monitoring or maintenance treatments, (where there is no rodent activity present), the distance between placement of rodent bait stations should take into consideration the likelihood of rodent access and harbourage within the particular area being treated.

N.B. Always check requirements for rodent station placement intervals contained in the specific food safety management system the customer's site operates under.

If rodent infestation occurs, it may be necessary to increase the number of bait stations in a localised area of the site or with a heavy or widespread infestation, increase the number throughout the entire site (prior to and during mouse plagues as an example) or until the rodent infestation is controlled, depending on the severity of the infestation.

N.B. A 'formal' or defined written rodent bait station service procedure should become part of the Pest Manager's Safe Work Practice or Standard Operating Procedure for Rodent Control Servicing in Food Sites.

Electronic Rodent Control

Electronic Reporting and Electronic Rodent Control systems and devices have been gaining increasing popularity for many years and is a growing segment of pest management, particularly in high risk and complex situations such as food handling facilities.

Much of the impetus for electronic servicing, particularly in regard to rodent management, originated in Europe, in the context of recent and upcoming changes in legislation regarding the restricted use of rodenticides, increased demands from certification organisations and compliance with the various food safety management systems. The perceived advantages of electronic reporting and rodent management include:

- Proof of service (date and time stamped)
- 24/7 rodent monitoring with early activity alert
- Tangible consistent data for trend analyses and measurement of IPM Program effectiveness
- Positive contribution to audit objectives (including certification)
- Possible non-tox rodent control solution if required (food based or synthetic attractants, substituting bait)

There is a plethora of reporting software apps available which can either be stand alone or integrated with electronic monitoring devices. Rodent devices also come in a variety of configurations, including:

- Monitoring only
- Monitoring and live trapping (can be single catch or multi catch)
- Catch and kill (and these vary widely in the method used and functionality)
- Devices can securely accommodate baits or non-tox alternatives

Basic Detector (monitoring only)

The simplest device is a detector, which can be mounted inside rodent stations but can also be positioned outside stations in many other locations, and simply sends a signal when a rodent comes within a defined radius. These work on thermal (body heat radiation) and/or movement (light intensity fluctuation). No killing function with this, but an alert where there is activity so corrective measures can be initiated.

Single Catch and Kill

A commonly device for detection and 'removable' of rodents is "Single Catch", which is a sensor in a regular bait station fitted with a snap trap. The electronic heat or thermal detection results in the signal being sent when the rodent enters the station and/or a movement induced signal when the trap activates.

Multi Catch
As the name suggests, these devices either trap multiple live rodents unharmed for removal later, or catch and kill multiple rodents, but either way, don't need resetting after every catch. The catch and kill type units, store the euthanised rodents in plastic or a preservative formulation for removal when capacity is reached and resets automatically after each catch.

Sewage System Detection and Kill
There are even, devices specifically designed for mounting in sewage pipes, where rats find refuge and shelter. This is commonly a stand-alone 'kill' device, whereby the dead rats end up becoming part of the sewerage process. This is quite a pre-emptive approach to rodent control as the activity is detected and actioned early within the rat's habitat before they enter areas where people and food are susceptible.

Electronic communication of Information
There are several more device and system configurations available but the common denominator is electronic transfer of information, whether it be rodent movement/detection, trapping, eradication or simply system servicing reporting data. And this form of data is generally food safety standard and auditor friendly.

Most electronic rodent systems are built on a modular-structure, providing a high degree of flexibility, enabling alteration and extension of the system according to site conditions and client needs. Information is relayed wirelessly via wireless local communication and can be monitored online.

The electronic devices or sensors which detect body heat, movement and/or trap catches. transmit to a router. The router in turn transmits to a control box, which ultimately communicates the information to mobile devices (phones or similar) a server or base electronic data collector. Systems or stand-alone devices can be powered by mains power, solar with batteries and/or standard nicad batteries.

Pros and Cons
As with most technologies, there are also important aspects and ramifications to consider with electronic rodent/pest management. As an example, there is a view that there may be a labour cost saving to the client (food business) as pest manager's service who regularly check and service multiple rodent stations (say weekly, fortnightly or monthly) are not necessary as the electronic stations report rodent activity 24/7.

However, this can be a false economy as some electronic systems require substantial capital expenditure to purchase, or alternatively, to rent, which may negate any labour cost saving.

It's one thing to save on service labour, but it is often still necessary to check rodent stations on a regular basis, and many of the current electronic systems do require physical checking on a regular basis.
Stations or devices with rodent attractants need checking and replenishing (possibly at monthly intervals, depending upon degree and scope of rodent activity, climate and type of business customer).
Attractants deteriorate, get consumed by non-target animals and insects and must be kept appealing and palatable to pest rodents.

Of course, if there is a discernible saving in labour time for pest technicians where electronic devices are being used in contrast to having to be onsite as regularly as they would with 'traditional' physical rodent control devices, that time could be better utilised providing the client with better reporting and advice towards hygiene, sanitation and proofing, which is also increasing in demand by discerning food businesses.
However one views electronic pest management, the undeniable reality is that its' probably here to stay.

15.1.3 Regulatory Issues

Currently there are restrictions on rodent glue boards in some states in Australia (Victoria) and in New Zealand. There are also strict procedures with the use of Live Catch Traps in some states. Some other traps are also being reviewed due to concerns of the cruelty to the rodents that are caught. As these regulations are under review at the time of writing this CoP, the Pest Manager should be familiar with what is acceptable in the various state or territory, and can therefore advise clients.

Regulations require daily inspection of live-catch traps (in Victoria and New Zealand currently). Any live rodents may need to be removed and released/relocated or humanely euthanised.

Rodent Management Guide - Non Chemical

Critical guidance: For any pest management program to be in any way successful, there must be support programs in place (this is even more essential where food is being handled). These support programs can be referred to as '**Pre-requisite Programs'.** These programs pertain to client food site practices and processes involved in the storage, handling and production of food.

Without these, pest management efforts on their own, will often only be partially effective. **'Preventative Measures' and 'Support Programs' are an absolute necessity** and apply to **most pest species** in most

Management Tool	Considerations Recommended	Actions
Snap Traps	- Suited to areas where bait is not acceptable and/or a non-toxic approach is needed - Often used when bait is not being eaten by target rodents - As a reactive rodent control method to eliminate rodents humanely - Not suitable for sites where protected/ native rodents are present - When selecting snap traps and any other 'lethal' traps, only those traps meeting the highest humane standard should be chosen - Break-back traps in general use different types of springs with varying opening angles, when set, ranging between 45 and 180 degrees	- Place in areas where rodents run, nest and feed. Traps should be moved after a few captures to minimise trap shyness with rodents - Snap traps should be ideally housed in lockable rodent stations to prevent injury to others and to maintain hygiene from flies blowing the dead rodents - All snap trap locations must be numbered and displayed on Site Maps. If snap traps are not a permanent control measure, a temporary map must be created until units are removed - Usually, larger opening angles are associated with greater impact momentum, and smaller opening angles with greater clamping force. - Both impact momentum and clamping force are greater in traps with 'double-peg' springs

PREVENTION (food site management)

- Regular cleaning and sanitation regimen
- Maintenance schedule
- Pest entry proofing and pest harbourage seal-up
- Stock Rotation Policy
- Incoming goods inspection, segregation and quarantine procedure
- Practical and effective warehousing and storage of bulk food ingredients and finished goods
- Robust packaging of food products to prevent pest penetration
- Effective waste management
- Food Site Staff Training Plan
- All competing food sources should be removed where possible

Confined Capture (live catch traps)	- There is legislation in some states (VIC.) Which mandates 24 hour inspection and removal of trapped rodents (even pest rodents) - In NZ the legislation for live capture trap states that all set traps must be manuall inspected 12 hours after sunrise (on each da the trap is set); or alternatively in the case o using a reliable electronic monitoring system with 24 hours after the alert of a capture animal. - Ideal for sites where protected/native rodents are present	- Place in entry ways, near feeding sites and burrows - Pest Managers must develop a humane euthanasia procedure for pest rodents once caught. Eg: CO2 Asphyxiation Chamber, Blunt Force Trauma or Cervical Dislocation - All live trap locations should be numbered and displayed on Site Maps. If live traps are not a permanent control measure, a temporary map will suffice until units are removed

Glue Boards	- Not suitable for sites where non-target species can become trapped on the glue. - Can be used as a last resort when bait is not being eaten and other methods have failed target rodents. - There is legislation in some states which restricts the use of glue boards in some areas to licenced pest managers and requirements for inspection intervals. ***Victorian legislation has banned the use of glue boards for rodent control.*** - The responsibility of glue boards and the required intervals lies with the pest manager and should be included in the initial scope of works. - - Should be used as a possible last resort	- Suited to sites where bait is unacceptable and/or a non-toxic approach is needed - Place in areas where rodents run and near feeding sites. Make sure the boards are moved after a few captures to reduce trap shyness - Normally used as a reactive rodent control method - All glue trap locations should be numbered and displayed on Site Maps. If glue traps are not a permanent control measure, a temporary map will suffice until units are removed
Non-Toxic Attractants	- Need to be checked regularly in order to detect any developing rodent activity before it becomes established - Not a rodent elimination tool - When rodent activity is detected, a method of rodent elimination is then needed which can result in double baiting (if rodenticides are used to resolve the activity)	- Suited to sites where bait cannot be placed and/or a non-toxic approach is needed (some food sites and other high risk sites such as health care) - Very efficient monitoring medium - All monitoring/attractant locations should be numbered and displayed on Site Maps. If these are not a permanent control measure, a temporary map will suffice until units are removed

Rodent Management Guide - Chemical		
Management Tool	**Considerations**	**Recommended Actions**
Baiting (rodenticides)	- A quick effective way to control rodents without needing to see them or find their feeding, nesting and harbourage sites - Suitable as both a pro-active and reactive rodent control method - The use of Rodenticides near exposed food and in food handling areas is strongly discouraged by most Food Safety Standards - **Loose Granular Rodent Bait** formulations should NEVER BE USED. And granular formulations even in lockable stations should be avoided in food handling areas (most FSMS discourage this) - **Liquid Rodent Bait** formulations should also be avoided in food handling areas (some FSMS discourage this). Can be used externally with written permission of the food business - Where the risk of non-target species and/or secondary poisoning exists, choose a 'low-tox' or first generation anti-coagulant formulation - All competing food sources should be removed where possible	- Rodenticide Product Label 'Directions for Use' must be strictly complied with - All bait must be registered for the intended use and situation - All bait must be secured inside tamper proof, lockable rodent stations, kept palatable and checked regularly - Rodent stations containing rodenticide must be secured in place with screws, cable, adhesive or similar sturdy method - All rodent stations containing granular bait pellets must be displayed on site map - **NO 'open'** (trays) bait containers permitted - **NO cardboard** bait stations permitted - In **critical situations, bait can be used** in food handling areas if agreed and documented with site management and if all other methods have failed

Tracking Powders	- Follow label directions closely when using tracking powders - There are restrictions on the use of tracking powders in food handling areas - An option where tracking powder can be combined with existing rodent food preferences - Can also be used where rodents will not consume bait. The powder is applied to runways etc, picked up on the rodents fur and then consumed via their grooming habits - Can be used in external areas in critical Situations with documented agreement with site management	- Suitable for conduit, pipes, etc in plant rooms, back of house, voids and cavities (with caution) - Can be deposited in rodent burrows, although pellets are better suited for this application - Can be mixed with a suitable food source (grains, nuts, fruits, etc) and then securely placed in lockable rodent stations when rodents are uninterested in bait formulations - Not to be used inside food site buildings anywhere near exposed food, food handling equipment food contact surfaces - All rodent stations containing tracking powder must be displayed on site map
Liquid Baits	- Liquid Rodent Bait formulations should also be discouraged in food handling areas. (However, they can be used outside of food handling areas with written permission of the food business) - Only used in dry/arid areas or during drought	- NOT TO BE USED INSIDE FOOD HANDLING AREAS (can be used in external areas in critical situations and documented agreement with site management) - All rodent stations containing liquid bait

Bait Stations	- Reduces access to the bait by some no target species - Provides a feeding site for rodents and keeps bait covered from the elements and from non-target species - Tamper proof lockable rodent stations are a requirement of all Food Safety Management Systems - The design, size and style of stations varies to cater for specific site conditions e.g.: target species, camouflage, aesthetics, vandalism and budget - All forms of rodenticide should be fixed inside the rodent station on metal rods or similar	- Number of bait stations installed will depend upon the existing and potential level of rodent activity, risk, industry standards and conducive conditions - The Directions for Use information on rodenticide product labels must be followed - Bait stations must display numbering on the outside of each station or on dedicated wall plagues fixed directly above - All Rodent stations should be secured in place - All rodent station locations should be numbered and displayed on Site Maps. If these are not a permanent control measure, a temporary map will suffice until units are removed. For stations that contain non-toxic baits in food handling areas, it is good practice

15.2 Flying Insects

- Flying insects are a hazard to Food Businesses principally because:
- Flying insects are extremely mobile, invasive, prone to feeding on waste and animal excrement and highly attracted to a variety of food products and food odours;
- Flying insects carry organisms which they may deposit in foodstuffs, causing spoilage and disease transmission
- Flying insects themselves become embedded in foodstuffs causing contamination;
- Flying insects may lay eggs in food products (in both bulk ingredients and finished goods)
- Flying insect eggs may hatch into larvae which feed on, spoil and contaminate food
- Flying insect presence in food premises is contrary to food regulations.

Main Flying Insect Pest species

In Australia and New Zealand, the most important flying insect pests in Food Businesses are flies. However, at times other flying insects such as moths, mosquitoes, wasps, bees, winged ants, termites, etc. may also constitute a hazard. An understanding of the biology of flying insects is extremely important in their management.

Flies

Flies belong to the Order Diptera and are recognised by having a single pair of wings attached to the second or middle segment of the thorax, the second pair of wings having been modified into ‘halteres’ - knobled organs which act as gyroscopic stabilizers during flight.

It is helpful to divide flies into three broad groups – houseflies, blowflies and fermentation flies - for the purpose of considering their management. Sometimes collectively referred to as the 'filth flies' because of their attraction to rotting biological material and animal faeces – these three groups are particularly important pests wherever food is manufactured, prepared, served or consumed.

Houseflies
The common housefly Musca domestica, has achieved a special prominence because of its ability to adapt to and cause havoc within the human environment. In addition, most of the significant health and pest management issues relating to the filth flies are exemplified in this species.

Biology and Habitat
In nature, houseflies have an important role in aiding the breakdown of plant material. Housefly adults prefer to lay eggs in warm moist decaying vegetable material, as can be found in animal or human manure, compost heaps and human refuse.

Adults are principally nectar and 'wet-waste' feeders and need a protein food component to mate and develop eggs. Liquid feeding is facilitated by a specially adapted sponge-like proboscis and liquids ingested in previous feeds are regurgitated onto food and other feeding substances to assist the process. Feeding is a constant activity in warm conditions and the highly mobile and inquisitive flies may visit several separate feeding sites in the space of a few minutes, guided by their extremely sensitive odour receptors.

Copulation occurs only once per female, which then oviposits (lays eggs) principally in decaying vegetable material where the eggs hatch into larvae which feed and then pupate nearby in soil or dry vegetable matter.

Adult flies are often attracted to the general vicinity of premises by an abundant food source such as flowering plants or refuse and are then attracted inside by other odours and favourable conditions (e.g. moderate temperature, high humidity). They are extremely well equipped with sensory receptors to facilitate this.

Like most flies, houseflies have excellent vision, colour preferences (for reflected light, yellow is preferred over green or blue) and are photopositive to (instinctively move towards) the ultraviolet end of the light spectrum from light sources. The optimal light wavelength being around 365 nanometres.

Houseflies are found in virtually every human habitat. Abundance is controlled largely by climatic and microclimatic conditions, hygiene and sanitation practices and availability of food. In warm climates adult flies are free ranging throughout the year and populations continuous. Where winters are cold, overwintering may occur or populations may be 'closeted' (e.g. restricted to within warm locations like animal rearing facilities).

Blowflies
The term 'blow' refers to the tendency of this group to oviposit (lay eggs) or larviposit (lay live larvae) on human food. Common Australian urban blowfly pest species include; Calliphora, Chrysomya, Lucilia and species belonging to the family Sarcophagidae - very large blowflies (sometimes called flesh flies) with 'checkerboard' patterns on their abdomens and which deposit live larvae directly on food.

Biology and Habitat
In nature, blowflies have an important role in aiding the breakdown of animal tissue. Blowflies share most of the features of their biology with the houseflies but there are some important differences.
For example:

- All blowflies prefer a protein-rich breeding medium (e.g. animal droppings, animal food, food waste, meat, dead and even live animals). Maggots found in exposed meat or animal carcasses are almost always from blowfly species. Presence of Sarcophagid adults, typically indicates the presence nearby, of a dead animal;

- A few species of blowflies – notably Sarcophagid and Calliphora species - larviposit (lay live larvae rather than eggs) – a particular problem for food preparation businesses;

The incidence of blowflies mirrors that of houseflies except that abundance is determined by the availability of animal material. This may take the form of exposed human protein food, food waste, or dead animals – even very small ones like garden snails or other insects.

Fermentation Flies
'Fermentation Flies' is a term commonly used to describe a diverse assortment of small flies from a number of different families which have one common feature - they all breed in wet decaying or fermenting organic materials, typically food or food residue of either animal or vegetable origin.

In nature, Fermentation Flies aid in the breakdown of animal and vegetable matter, particularly where such materials have already begun to decompose.

Families falling within this description include for example: vinegar flies (Drosophilidae); moth flies (Psychodidae); some species of fruit flies (Tephritidae) and occasionally, scuttle flies (Phoridae) or small dung flies (Sphaeroceridae):

Vinegar flies (sometimes also called 'ferment flies') – Family Drosophilidae, are tiny flies found both inside and outdoors, mostly associated with decaying fruit or vegetation. The adults typically are brown or yellow in colour.. A distinguishing feature of the commonly encountered vinegar fly (Drosophila melanogaster) are bright red eyes. They oviposit directly into the fermenting matter in which the larvae feed, frequently pupating in any dry site nearby

Moth flies – eg. Psychoda alternata - are so called because of their hairy, moth-like appearance. The adults are not prolific feeders but frequently lay their eggs in and around drains and sewers, where the larvae feed in the 'biofilm' inside the drain and develop through to pupation. These flies commonly are found in food preparation areas in moderate to large numbers and bathrooms in smaller numbers. They can be found in large numbers where drainage or sewage is defective.

Phorid flies - Also known as "Scuttle Flies" breed in moist organic matter eg. drains, garbage, damp soil, mops, decaying food. They are small flies (2 mm) with a humped back and small head - NO red eyes. Often runs along surfaces when disturbed, instead of simply flying away. Often mistaken for Vinegar flies. The usual species associated with sump drains in floors.

Fruit flies – Family Tephritidae, are mostly colourful flies with a very distinct separation of head and thorax. Typically the female has a prominent ovipositor which she uses to 'strike' (oviposit in) ripening fruit. The developing larvae eat and hence spoil the fruit causing significant damage to some crops, before pupating in the soil.

Biology and Habitat
Female Fermentation Flies lay their eggs and the larvae feed in wet, decaying or fermenting "organic" material ('sludge'). After feeding, the larvae find a drier site in which to pupate and they emerge as adults with a typical life cycle of between 8 and 15 days.

Fermentation Flies will breed in almost any place that even small amounts of wet organic waste accumulate and remain undisturbed due to the absence of cleaning activities.

Typical breeding sites in domestic houses or Food Premises are:

- Floor drains (even relatively small amounts of residual 'sludge' in drains can sustain an infestation). A high proportion of infestations have their focus here;
- Grease traps, sewage pits and settlement ponds
- Poorly cleaned and/or continually wet floor or in-cupboard areas (inevitably there are crevices in which wet sludge can persist and sustain an infestation);
- Wet or damp mops, cleaning cloths or refuse left in cupboards or other storage locations;
- Decaying fruit or vegetables (or residue thereof) in storage containers;
- Residue left in waste bins which have not been properly cleaned;
- Water receptacles which have accumulated sludge over time, such as refrigerator or air conditioner evaporation trays, water trays under pot plants, etc.
- Almost ANY area which is frequently or constantly wet and not subjected to regular, careful cleaning.

Fermentation Flies are found in virtually every human habitat. Abundance is controlled largely by hygiene, sanitation and waste disposal practices which control the availability of their food.

15.2.1 Flying Insect Management

The actions needed to manage flying insects differ depending on the location of the pest, particularly on whether they are inside or outside the Food Business. Actions are determined during the pre-treatment inspection, but invariably involve reducing the attractiveness of the site to flying insects.

Other Flying Insects

Many flies and moths are attracted to light.

Light traps placed near external doors may attract flies and moths from outside. External doors should be kept closed whenever possible, especially at night. It is important to distinguish between these 'fly ins' from those that may be breeding within the premises, especially when collating counts on traps.

The probability of flying insects entering a Food Business increases when insect numbers attracted to the location of food premises are high. Examples of common management tools and recommended actions to reduce attractiveness of the site are:

Flying Insect Management Guide – Outside - Non Chemical		
Management Tool	**Considerations**	**Recommended Actions**
Location of flowering plants	Flying insects are very attracted to flowering plants as they obtain most of their energy requirements from this source.	Ensure that no flowering plants are located within 10 metres of any entrance to the building.
Exterior cleanliness	1. External objects or furniture that is contaminated with food are highly attractive to flying insects. 2. Houseflies and lesser houseflies often feed and develop in lawn clippings which provide ideal conditions when decomposing which produces heat, moisture and bacteria.	1. Ensure that exterior furniture, garbage bins, pathways, disused production machinery and equipment, surrounds, etc. are kept very clean and free of food residues and refuse. 2. Ensure grass/lawn clippings are put into sealed garbage, bins or bags and not deposited in piles around shrubs and trees.

Odour attractants	Poorly serviced building exhaust systems create food odour plumes that attract flying insects to the site, sometimes over considerable distances. This is especially true for blowflies	Ensure that a regular schedule of cleaning exhaust outlets and filters is in place and that the outlets are adequately screened.
Waste management	1. Dirty, open or overflowing waste skips containing exposed food waste are highly attractive to flying insects and retain them near the food premises. 2. Residual beverage or liquid in containers awaiting recycling are highly attractive to flying insects, especially fermentation flies.	1. Ensure that a policy of sealed bagging of all waste is in place. That waste skips are cleaned before delivery and after emptying, and the skips are kept closed except when waste is being added. 2. Store empty beverage containers in a way which minimises residue content. This will depend on storage circumstances. For example cans might be crushed and bagged and bottles stored inverted and hosed down if circumstances permit. Bottles with liquid residue maybe stored inside cold rooms and/or in bins with tight fitting lids.
External Lighting	Bright lighting facing outwards from food premises can attract the larger cockroach species which are strong fliers, to the building at dusk and during the night.	Where practical, substitute mercury vapour globes (which give off bright white light), with Sodium vapour globes, which emit a softer, duller yellow light (less attractive to cockroaches).

Flying Insect Management Guide - Outside - Chemical		
Management Tool	**Considerations**	**Recommended Actions**
Insecticide treatment of insects resting sites outside buildings.	Treatment of observed flying insects resting sites with residual insecticide can significantly reduce flying insect numbers.	Determine if flying insects are utilising external building surfaces as resting sites. Where appropriate, apply a residual insecticide registered for the purpose. Several fly products incorporate an attractant (usually pheromone based) which enhances the results. Masonry surfaces may need to be sealed or painted beforehand to achieve satisfactory residual control.

External baiting of adult flying insects	A regular baiting program can significantly reduce flying insect numbers, especially houseflies and blowflies.	Institute a baiting program. Confirm effectiveness and bait replacement by monitoring numbers of insects killed. Lure attractants may be used where appropriate. Flying insect baits are available in spray on (as mentioned in previous section), paint on and granular formulations.
Elimination of external flying insect breeding sites.	Some Food Businesses inadvertently provide breeding sites for flying insects outside their premises. Examples are: 1. Houseflies breeding in moist compost. 2. Fermentation flies breeding in dirty drains. 3. Houseflies and blowflies breeding in exposed garbage or other waste. 4. Houseflies, blowflies and fermentation flies breeding in animal droppings eg: abattoirs, piggeries and poultry farms. All these situations need to be identified and eliminated (where possible) or minimised or treated.	1. Eliminate from gardens, any heavily layered moist compost or mulch with high organic content. 2. Ensure that a regular program of thorough cleaning of external drains and sullage pits is in place (see table above). 3. Ensure that a regular program of waste management is in place and/or a site treatment with residual insecticide is applied if appropriate (see table above). 4. Ensure that a regular program of waste management is in place where practical and/or a site treatment with baiting for fly larvae in animal droppings if practical.

Flying Insect Management Guide - Preventing entry		
Management Tool	**Considerations**	**Recommended Actions**
Window and door screening	1. Where windows, doors or ventilation points are required to be open, insect screens can prevent ingress of flying insects. 2. There can be many other points where flying insects can gain entry through the fabric of a building into the internals of the building.	1a. Where appropriate, install tight fitting insect screens or screen doors and ensure that they are maintained in good condition. 1b. Ensure exhaust fans and ventilation outlets have insect mesh installed over the openings. 2.Seal off gaps around penetrations (service pipes, electrical conduits, conveyor belts etc) in walls, ceilings and floors.
Door opening and closure	Minimising the time doors and windows remain open, reduces the probability that flying insects will enter.	Where appropriate, fit self-closing or 'auto-open and close systems' to doors and ensure that the 'open time' is minimised.
Air curtains	Where entries or exits from Food Businesses must remain open, air curtains if correctly specified and installed, can provide a fast moving airstream which expels most flying insects which attempt to enter.	Where appropriate, fit air curtains to building entry and exit points. Ensure that they are operating to specifications and that the airflow is directed outwards.
Strip curtains	Where entries or exits from Food Businesses must remain open and air curtains cannot be justified, strip curtains can provide a physical barrier to deter some flying insects which attempt to enter.	Where appropriate, fit strip curtains to building entry and exit points. Ensure that the strips provide a continuous visual barrier to approaching insects when they are hanging motionless.
Door and window seals	When doors or windows are not completely sealed and gaps exist, flying insects (especially flies) may walk through the gaps to gain entry.	1. Ensure that all windows and doors provide no gaps when closed or around the edges of the screens. Ensure that seals on windows and doors are maintained in good condition. 2. Install draft excluders along the bottom of doors where gaps exist.
Air-conditioning temperature, efficiency and positive pressure	It has been found that when air-conditioning and ventilation systems are well maintained and provide a cool, low-odour, environment, comfortable to humans, and with a positive indoor pressure, these conditions are relatively unattractive to flying insects.	Ensure that air-conditioning and ventilation systems are well maintained and provide a cool, low-odour, environment with a positive indoor pressure. A slight outward flow of air should be detectable when a door is partly-opened.

Flying Insect Management Guide - Inside		
Management Tool	**Considerations**	**Recommended Actions**
Light Traps Light traps (contin…)	1. Commercial traps are available which utilise ultraviolet light to attract flying insects and use either adhesive boards or electrocution grids to capture or kill the insects. These traps are moderately effective (depending upon species) at eliminating flying insects but only if they are properly maintained and positioned. In particular, adhesive boards should be changed at least monthly or whenever approx. 70% of their surface is covered with insects. The light tubes must be changed as per manufacturer's instructions (even though still lighting). 2. Many food safety management systems require numbers and species of flying insects to be recorded. This information is used to generate trend analysis and is often reviewed during audits. 3. Many food safety management systems and audits require the recording of light unit board and globe changes. This also ensures the lights remain attractive to flying insects. 4. Positioning of UV light units is crucial to the success or otherwise of the flying insect control program, particularly with flies.	1. Install light traps with shatterproof light tubes (to minimise the risk of broken glass contaminating food) in all internal areas of the Food Business where flying insect infestation has been experienced. Follow manufacturer's instructions regarding number, location and servicing of the traps. Note in particular that adhesive board types are generally preferred as they are also useful as monitoring tools and that electrocution traps must not be installed in food preparation areas. 2. Ensure that a program of trap monitoring and maintenance is established and routinely reviewed. As a minimum, data recorded should include: location of trap; numbers and species of large, medium and small flies; numbers and species of 'other' insects captured (with descriptions). 3. Globes should always be labelled with their installation dates and/or a "Record of Globes Changes" developed and maintained. 4a.<u>Positioning of units</u> - Draw the insects away from a sensitive area, not to it (away from food product). Do not install above areas where open food is handled, such as food preparation benches. 4b.<u>How many units</u> - Research shows that flies only respond to a U.V. light from 6 or 7 metres away. Accordingly, position lights at 12 to 15 metre intervals.

Flying Insect Management Guide - Inside		
Management Tool	**Considerations**	**Recommended Actions**
Auto Sprayers (Timed release aerosols)	Auto-spraying devices dispense a measured dose of aerosol insecticide at timed intervals into the air-space using a battery powered dispenser. Only pyrethrum formulations should be used as these have relatively low mammalian toxicity but are moderately effective against flying insects. These devices may kill nearby insects and the air-borne spray can be carried around the airspace and may kill some flying insects further away from the device which receive a lethal dose. These devices are only effective if they are properly maintained. The aerosol cans must be changed according to adjusted usage rates and batteries replaced as per manufacturer's instructions (typically annually). Although the natural 1-10% Pyrethrum in the aerosol can is non-scheduled on the national Poisons Standard due to it's low mammalian toxicity, the product still contains additional ingredients which should be of some concern, particularly when airborne (in human breathing space). Those ingredients are approx. -1-10% Piperonyl Butoxide (a synergist) -30-60 % Liquid Hydrocarbon (petroleum based propellant) -30-60 % Ethanol. The specific individual parts per million of these in a given air-space would not normally breach the thresh-hold limit values (acceptable concentrations) for humans but this may not hold true depending upon the size of that space and air-currents etc.	

Drain cleaning	Even small amounts of sludge/residue in drains, damp floor mops, cleaning cloths or un-noticed wet waste, can sustain infestations of some fly species, especially small fermentation flies.	Ensure that a regular program of thorough cleaning of internal drains is in place. If necessary combine this with a drain treatment using a bio-cleansing agent (bactericide). Also ensure that mops and cleaning cloths are rinsed out and dried after use and all wet waste is eliminated. Get written permission from the food business before using a biologically active or bactericidal drain product."
General interior cleanliness	Flying insects that are attracted to and feeding on food-contaminated surfaces remain fairly immobile and less likely to be trapped or dosed with insecticide and hence eliminated.	Ensure that a high level of cleanliness is maintained inside food premises. A thorough, regular cleaning program/regimen should be developed, documented and maintained by the food site management.

15.3 Cockroaches

Cockroaches are a hazard to Food Businesses because:

- Whole cockroaches, body parts, faeces and other secretions can contaminate food and equipment.
- Cockroaches spend time in unhygienic areas and may transfer pathogens from these areas to food utensils or food preparation areas or machinery.
- Cockroaches or their secretions may cause shorting of electrical equipment.
- Cockroaches have an odour and this may be imparted to the establishment or food.
- Clients will be discouraged from using the establishment if they see cockroaches and staff morale will also be reduced.
- At least 32 species of bacteria have been isolated from cockroaches that can cause a variety of symptoms such as, diarrhoea, gastroenteritis, urinary tract infections, food poisoning, conjunctivitis, wound infections, Salmonella and other serious illnesses.
- Cockroaches have also been found to harbour the eggs of 7 species of worms and several species of fungi and viruses.

Main Cockroach Pests

An understanding of cockroach biology is important in the pest management of cockroaches.

The two principal pests in food establishments are the German cockroach Blattella germanica and American Periplaneta americana.

It is important to understand that cockroaches are nocturnal and forage for food and water at night. They spend the day hiding in cracks and crevices or other hidden spaces such as wall and ceiling voids, drains and subfloors.

The German cockroach is the most common pest cockroach in food establishments. Adults are about 15mm long and first instar nymphs are about 3mm long. They are smaller than the other important Pest species and are able to live and breed in the numerous cracks and crevices present in commercial premises. Their small size means that they are initially tolerated or not noticed.
Their rapid reproduction rate enables a few individuals to become a Pest problem over one season as each female produces an ootheca containing around 30 - 48 eggs, and females may produce between 4 - 8 oothecae. These eggs can become adult in 6 - 10 weeks in the warm conditions which means rapid population build-up.

American cockroaches are often called “peri domestic cockroaches” because they can live around buildings. Common areas where they are found include gardens areas, around garbage, inside drains and in out-houses such as sheds or garages. They can be common in sewers and sewer manholes.

American cockroach is the largest of the Pest species growing to around 45mm in length. It is relatively slow growing reaching maturity in 6 to 12 months.

There are fewer generations per year than with the German cockroach and infestations are slower to build up. Because of the large size of both adults and nymphs people are less tolerant of these cockroaches in food establishments and they also find fewer places to hide in the daytime. When they become established. they are normally found in wall voids or behind cupboards, in underfloor areas or roof spaces.

There are other pest species of Periplaneta in Australia, New Zealand, and throughout the world, and these may be as common as American cockroach in some areas.

The Smoky Brown cockroach Periplaneta fuliginosa is found in and around Sydney and Hawkes Bay NZ, and Australian Cockroach Periplaneta australasiae is found commonly in tropical and sub-tropical areas of Australia and northern NZ.

Both are peri domestic cockroaches which feed mainly on garden organic matter and waste but they will forage inside buildings and establish in garages, outbuildings, under floor areas and wall voids. These species are not usually found in sewers, unlike the American cockroach.

Cockroach Management Guide - Outside		
Management Tool	**Considerations**	**Recommended Actions**
Waste management	Dirty, open or overflowing waste skips containing exposed food waste are highly attractive to cockroaches and retain them near the food premises as well as providing breeding sites.	Ensure that a policy of sealed bagging of all waste is in place; that waste skips are cleaned before delivery and the skips are kept closed except when waste is being added.
Activities of neighbours	Poor hygiene or waste management practices of neighbours will attract cockroaches to the site of the Food Business as well as the site of the neighbour. Also, some neighbourhood activities such as stables, recycling depots, composting facilities, etc., are highly attractive to cockroaches and retain them in the neighbourhood.	Collect some data to support any observations made about insect numbers sourced from a neighbour (e.g. count or photograph cockroaches on a defined area outside the food premises on the neighbour's and opposite sides, over several warm nights). Meet with the neighbour to discuss the matter and try to reach agreement to rectify the problem. If several attempts fail, consider discussing the issue with your local council Environmental Health Officer.
Cleaning external drains and sullage pits and grease traps	Dirty external drains, grease traps and sullage pits are attractive to cockroaches and retain them near the food premises.	Ensure that a regular program of thorough cleaning of external drains, grease traps and sullage pits is in place. If necessary combine this with a treatment using a bio-cleansing agent.
Minimisation of plants and mulch/ litter around buildings	1. Cockroaches can live in accumulated plant material around buildings. 2. Cockroaches often feed and develop in lawn clippings which provide ideal conditions when	1. Advise client to limit plantings close to buildings particularly near to entrances. 2. Ensure grass/lawn clippings are put into sealed garbages, bins or bags and not deposited in piles around shrubs and trees.
Exterior cleanliness	Accumulated equipment and rubbish around buildings provide hiding places for cockroaches.	Clear site of refuse, old machinery and equipment
Insecticide treatment of cockroach harbourage sites outside buildings	Treatment of observed cockroach harbourages with residual insecticide can significantly reduce cockroach numbers.	- Determine where cockroaches are utilising external building surfaces as resting sites or treat where activity is suspected, including garden mulch, retaining walls, drains, grease traps and garbage areas. Where appropriate, apply a residual insecticide registered for the purpose. - Product label directions should always be followed.

Barrier sprays	Application of insecticide to areas which cockroaches must cross to enter buildings can reduce infestations.	Spray areas around potential entry points with residual insecticide, e.g. around window frames, doors, building foundations, gardens and landscaping.
External baiting of cockroaches	A regular baiting program can significantly reduce cockroach numbers.	Institute a baiting program. Confirm effectiveness and bait replacement by monitoring numbers of insects killed.
Elimination of external cockroach-breeding sites.	Some Food Businesses inadvertently provide breeding sites for cockroaches outside their premises. Some examples are: • Moist compost and unkept gardens and grounds; • Dirty drains; • Exposed garbage. These sites need to be identified and eliminated or minimised.	1. Eliminate from gardens, any heavily layered moist compost or mulch with high organic content. 2. Ensure that a regular program of thorough cleaning of external drains and sullage pits is in place (see table above). 3. Ensure that a regular program of waste management is in place (see table above).

Cockroach Management Guide - Inside and Exclusion		
Management Tool	**Considerations**	**Recommended Action**
Window and door screening	1. Where windows, doors or ventilation points are required to be open, insect screens can prevent ingress of cockroaches. 2. There can be many other point where cockroaches can gain entry through the fabric of a building into the internals of the building.	1a. Where appropriate, install tight fitting insect screens or screen doors and ensure that they are maintained in good condition. 1b. Ensure exhaust fans and ventilation outlets have insect mesh installed over the openings. 1. Seal off gaps around penetrations (service pipes, electrical conduits, conveyor belts etc) in walls, ceilings and
Door opening and closure	Minimising the time doors and windows remain open, reduces the probability that cockroaches will enter.	Where appropriate, fit self-closing or 'auto-open and close systems' to doors and ensure that the 'open time' is minimised.
Door and window seals	When doors or windows are not completely sealed and gaps exist, cockroaches may walk or fly through the gaps to gain entry.	1. Ensure that all windows and doors provide no gaps when closed or around the edges of the screens. Ensure that seals on windows and doors are maintained in good condition. 2. Install draft excluders along the bottom of doors where gaps exist.
Cartons and packaging	Cockroaches or their egg cases may be present in packaging.	A designated quarantine area should be set up outside the food business buildings. Inspect packaging and goods on arrival. If cockroach activity is found on incoming goods, the goods should be placed in the quarantine area for appropriate treatment. Remove packaging from premises once goods are unpacked.

Cockroach Management Guide - Inside and Exclusion		
Management Tool	**Considerations**	**Recommended Actions**
Building Maintenance and Exclusion techniques	Cracked or missing tiles, poor wall or floor surfacing and badly maintained fittings can provide harbourage for cockroaches.	Advise client of maintenance issues which are encouraging cockroaches. Proofing/sealing off cockroach harbourage areas can be done by the food business staff or recommended and completed by the pest manager Check fixtures for small cracks and crevices and fill these. Close holes into the buildings from wall voids. Put mesh over drains.
Food storage	Open food containers or unwrapped food will provide food for cockroaches.	All food should be stored in closed containers or fridges.
Open water / dripping taps	Cockroaches need water as well as food.	Limit access to water by advising of areas which could be providing watering points for cockroaches.
Drain cleaning	Even small amounts of waste in drains, damp floor mops, cleaning cloths or unnoticed wet waste, can provide food for cockroaches.	Ensure that a regular program of thorough cleaning of internal drains is in place. If necessary combine this with a drain treatment using a bio-cleansing agent. Get written permission from the food business before using a biologically active or bactericidal drain
General interior cleanliness	Cockroaches will feed on any spilled food on surfaces.	Ensure that a high level of cleanliness is maintained inside food premises.
Sanitation/hygiene	Surfaces and floors with residual food encourage cockroaches as do food and dirty utensils left out overnight.	Daily clean-up of surfaces, floors and waste is essential for good cockroach control.

Cockroach Management Guide - Inside Monitoring and Treatment		
Management Tool	**Considerations**	**Recommended Actions**
Monitoring cockroach traps	Cockroaches have specific breeding and hiding places. It is important to target these during the control phase.	The placement of monitoring cockroach traps in key areas to help monitor cockroach numbers to assess the effectiveness of the treatment program.
Inspection torch/ flushing aerosol	Cockroaches have specific breeding and hiding places. It is important to target these during the control phase.	Prior to treatment the premises should be inspected to locate breeding sites and hiding places. The use of a torch and flushing aerosol will aid this.
Baits/Gels	Cockroaches forage for food and will eat baits or gels and are killed. They may also transport the material back to their hiding places and cause death of other cockroaches.	Place baits or gel spots in areas where cockroaches hide and forage. Avoid placing baits or gels in high traffic areas, areas frequently washed, or food preparation surfaces. Limitation:. Bait gels can be effective to control German roaches, which tend to congregate in warm, moist feeding and harbourage areas. However, the same does not apply to the larger species e.g.: American and Smokey Brown roaches, which are more erratic and widespread in their feeding and harbourage behaviour.
Residual Insecticides	Cockroaches which walk over treated surfaces or stay in treated hiding places will be killed.	Spot treatments to areas where cockroaches walk or hide but which will not be contacted by people and food stuffs, e.g. wall voids, undersides of fittings, benches, and freezers. Crack and crevice treatments to small gaps where cockroaches hide e.g. expansion joints between fittings, gaps in the corners of cupboards.
Insecticidal Dust	Insecticidal dust can be used to penetrate deep into voids and to treat some electrical equipment which could be damaged by wet sprays.	Apply to cracks and crevices and wall and cabinet voids. They should be applied with care around electrical equipment. Do not apply dusts in, over or around food handling areas (unless all these surfaces are washed thoroughly after treatment.
Space treatments	Non residual/ flushing/ fast knockdown insecticides can be useful in heavy infestations. These can be applied via ULV Misters, Thermal foggers or high pressure aerosols and CO_2 propellant cylinders.	These need to be applied when the premises are vacated. Specific written preparation, ventilation and clearance procedures are mandatory requirements with space treatments. No-entry periods and exclusion procedures must be complied with.

15.4 Other Crawling Insects

Crawling insects are a hazard to Food Businesses principally because:

- They are mobile, invasive, prone to feeding on waste and animal excrement and highly attracted to a variety of food products;
- They carry organisms which they may deposit in foodstuffs, causing spoilage and transmitting disease;
- They may themselves become embedded in foodstuffs causing contamination;
- Their presence in food premises is contrary to food regulations.

Main Crawling Insect Pest Targets

In Australia and New Zealand crawling insects such as ants, beetles, crickets, earwigs, millipedes, spiders (Arachnida), fleas, slaters etc. may constitute a hazard. (Note: cockroaches are in a separate section – see 15.3.).

The actions which need to be taken to manage crawling insects differ depending on the location of the pest, particularly on whether they are inside or outside the Food Business. Actions are determined during the pre- treatment inspection.

Crawling Insect Management Guide - Outside		
Management Tool	**Considerations**	**Recommended Actions**
Location of garden beds, plants and other vegetation	Crawling insects are very attracted to garden beds as they obtain much of their energy requirements from this source.	Ensure that no garden beds are located within 10 metres of any entrance to the building. Maintain all garden areas.
Exterior cleanliness	External objects will act as a harbourage area for crawling insects.	Ensure that exterior is clear of objects within a 10 metre area of entrances.
Odour management	Poorly serviced building exhaust systems create a food odour plume that attracts crawling insects to the site, sometimes over considerable	Ensure that a regular schedule of cleaning exhaust outlets and filters is in place and that the outlets are adequately screened.
Waste management	Dirty, open or overflowing waste skips containing exposed food waste are highly attractive to crawling insects and retain them near the food premises.	Ensure that a policy of sealed bagging of all waste is in place, waste skips are cleaned before delivery and the skips are kept closed except when waste is being added. Store empty beverage containers in a way which minimises residue content. This will depend on storage circumstances. For example; cans might be crushed and bagged and bottles stored inverted and hosed down if circumstances permit.

Activities of neighbours	Poor hygiene or waste management practices of neighbours will attract crawling insects to the site of the Food Business as well as the site of the neighbour.	Collect some data to support any observations made about insect numbers sourced from a neighbour. Meet with the neighbour to discuss the matter and try to reach agreement to rectify the problem. If several attempts fail, consider discussing the issue with your local council
External lighting	Bright lighting facing outwards from food premises can attract crawling insects to the building at dusk and during the night.	1. Where possible, locate external lighting so that it faces towards the building (e.g. on poles separated from the building). 2. Where practical, substitute mercury vapour globes (which give off bright white light), with Sodium vapour globes, which emit a softer, duller yellow light
Cleaning external drains and sullage pits	Dirty external drains and sullage pits are attractive to crawling and retain them near the food premises.	Ensure that a regular program of thorough cleaning of external drains and sullage pits is in place. If necessary combine this with a treatment using a bio-cleansing agent.
Seal buildings	Crawling insects will invade and harbour in the building.	Seal all buildings penetrations, vents, doors, windows, roof voids, sub floor to prevent crawling insect invasion.
Elimination of external crawling breeding sites.	Some Food Businesses inadvertently provide breeding sites for crawling insects outside their premises. Examples are: 1. Moist compost breeding a range of crawling insects; Dirty drains breeding crawling insects.	

Crawling Insect Management Guide - Outside - Chemical		
Management Tool	**Considerations**	**Recommended Actions**
Insecticide treatment of insect resting sites outside buildings	Treatment of observed crawling insect resting sites with residual insecticide can significantly reduce crawling insect numbers. Treatment of observed crawling insects with a non-residual insecticide can significantly reduce crawling insects. Treatment of observed crawling insects with a bait insecticide can significantly reduce crawling insects.	Determine if crawling insects are utilising external building surfaces as resting sites. Where appropriate, apply an insecticide registered for the purpose. Determine if crawling insects are breeding in garden beds and low life vegetation. Where appropriate apply insecticide residual, non-residual and/or bait formulation. Product label directions should always be followed.
External Biological treatment	A regular baiting program can significantly reduce crawling insect numbers, especially millipedes.	Institute a biological control program. Confirm effectiveness and bait replacement by monitoring numbers of crawling insects killed.

Crawling Insect Management Guide - Inside		
Management Tool	**Considerations**	**Recommended Actions**
Window and door screening	1. Where windows, doors or ventilation points are required to be open, insect screens can prevent ingress of crawling insects. 2 There can be many other points where crawling insects can gain entry through the fabric of a building into the internals of the building	1a Where appropriate, install tight fitting insect screens or screen doors and ensure that they are maintained in good condition. 1b Ensure exhaust fans and ventilation outlets have insect mesh installed over the openings. 2. Seal off gaps around penetrations (service pipes, electrical conduits, conveyor belts etc) in walls, ceilings and floors.
Door opening and closure	Minimising the time doors and windows remain open, reduces the probability that crawling insects will enter.	Where appropriate, fit self-closing or 'auto-open and close systems' to doors and ensure that the 'open time' is minimised.
Door and window seals	When doors or windows are not completely sealed and gaps exist, crawling insects may walk through the gaps to gain entry.	1. Ensure that all windows and doors provide no gaps when closed or around the edges of the screens. Ensure that seals on windows and doors are maintained in good condition. 2. Install draft excluders along the bottom of doors where gaps exist.
Drain cleaning	Even small amounts of 'sludge' in drains, damp floor mops, cleaning cloths or un- noticed wet waste, can sustain infestations of some crawling insect species.	Ensure that a regular program of thorough cleaning of internal drains is in place. If necessary combine this with a drain treatment using a bio-cleansing agent. Also ensure that mops and cleaning cloths are rinsed out and dried after use and all wet waste is eliminated.
General interior cleanliness	Crawling insects that are attracted to and feeding on food-contaminated surfaces remain fairly immobile and less likely to be trapped or dosed with insecticide and hence eliminated.	Ensure that a high level of cleanliness is maintained inside food premises.

Crawling Insect Management Guide - Inside - Chemical		
Management Tool	**Considerations**	**Recommended Actions**
Traps	Commercial traps are available which monitor crawling insects' activity. Traps include adhesive glue traps; a durable tamper resistant station with an adhesive glue trap secured inside. The stations will attract crawling insects by including a pheromone or a food based lure, to increase attraction e.g. an indicator block. These traps are moderately effective at eliminating crawling insects but only if they are properly positioned and maintained. In particular, adhesive boards should be changed at least monthly or whenever approx. 70% of their surface is covered with insects. If the glue traps are contaminated the adhesive trap will need to be replaced. E.g. water and dust damage.	Install traps in all internal areas of the Food Business to monitor crawling insect infestation where activity has been experienced. Stations should be secured to cover all crawling insect conducive conditions. If further monitoring is required stations should be secured at a minimum of 10 metre intervals. Attention should be given to doorways, loading docks and other areas where pests can gain entry. Follow manufacturer's instructions regarding number, location and servicing of the traps. Note in particular that adhesive board types are generally preferred as they are also useful as a monitoring tool. Ensure that a program of trap monitoring and maintenance is established and routinely reviewed. As a minimum, data recorded should include: Date, location and number of trap; numbers of large, medium and small crawling numbers of 'other' insects captured (with descriptions, or preferably, species).
Insecticide treatment of insect resting sites inside buildings	Treatment of observed crawling insect resting and harbourage sites (cracks, crevices, cavities and voids) with residual insecticide, can significantly reduce crawling insect numbers. Treatment of observed crawling insects with a non-residual insecticide that can significantly reduce crawling insects.	Determine if crawling insects are utilising internal building surfaces as resting sites. Where appropriate, apply an insecticide registered for the purpose. Product label directions should always be followed.

15.5 Stored Product Insects (SPI's)

Stored Product Insects are a hazard to Food Businesses principally because:

- They can consume and/or damage both raw materials and finished goods.
- There is direct contamination of commodities by their excrement, dead bodies, cast larval skins etc.
- They may themselves become embedded in foodstuffs causing rejection of contaminated product by consumers, resulting, in many cases, quite significant social and legal costs and/or harm to a brand.
- Food commodities infested with Stored Product Insects often exhibit rapid mould growth which can include fungi that produce mycotoxins which may be toxic on consumption.
- Some can be, but are not necessarily, a vector for food borne illness or other microorganisms which cause spoilage.
- Their presence in or near food is contrary to food regulations.
- Their presence in food can damage the food business brands

Stored Product Insects – A Management Overview

In Australasia, there are several important Stored Product Insects in Food Businesses depending on the commodity. There are approximately 18 species of Stored Product Insects that are of major economic importance. They include several species of moth and beetles in which the larval stage of the life cycle is the primary cause of concern. However all stages, eggs, larvae and pupae all contribute to the contamination of food.

Stored Product Insects are often categorised as primary and secondary invaders. Primary invaders can penetrate and infest intact grains, seeds and nuts. Primary Stored Products Pests cause damage to stored grains by directly feeding on the grain at some point in their lifecycle (usually the larval stage). They will attack grains that are intact and stable and can develop and reproduce very quickly when the conditions are optimal. Many species of stored product beetles feed internally in grain kernels as larvae. Of the beetles (Coleoptera) grain and rice weevils, and lesser grain borer all develop initially inside the grain or rice kernel. The Angoumois grain moth is the only lepidopteron internal feeder.

Secondary invaders utilise damaged or milled cereals (rolled, kibbled or flours) and dried fruits. These include many species of beetles such as carpet, cigarette, drugstore, flour, grain, fungus, hide, larder, mealworm, spider and warehouse beetle, also several species of moths including almond, clothes, house, Indian meal moth, Mediterranean flour moth, (warehouse moth is the almond moth – so use one or other) species of booklice and cheese and flour mites.

The actions needed to manage Stored Product Insects differ depending on the origin or location of the Pest, particularly on whether they are inside or imported from outside the Food Business. All participants in the supply chain must participate in protecting raw material or products from infestation by Stored Product Insects.

Stored Product Insects are mainly insects that have adapted to exploiting certain foods in storage. There appears to be an increase in Stored Product Insects in the supply chain. This is for a variety of reasons. It is not acceptable to directly treat food products with pesticides (with some exceptions such as grain storage and fumigation).

There is less fumigation treatment occurring of raw material being done as many of these Pests are no longer a quarantine issue as they are already established and not eligible for official treatments and the inability for customer request (voluntary) treatments to be done with Methyl Bromide. This means more emphasis on receiving infestation free material and protecting it from such. This requires a combination of preventative measures such as exclusion (e.g. robust packaging), sanitation (cleaning to deny Pests

access to a food source) and devices and technologies to monitor for and treatments to safely intercept these Pests.

Detection can be difficult if only eggs or young larvae are present. Trapping devices can be installed in high risk production and storage areas, and servicing is at an appropriate interval. The species specific pheromone lures employed in the traps will have a designated replacement cycle. Note: these are useful to intercept adult moths and beetles dispersing and potentially incurring fresh infestation but cannot be relied on as a sole control measure. The source must always be dealt with by removal or where possible treatment. The larval stages are less mobile and require closer inspection and localised monitoring methods such as sticky board traps with appropriate lures or without (so called blunder traps).

Pesticides can only be used as environmental non product contact treatments. The material choice is further regulated by the risk of chemical contamination. Where product or product contact surfaces are present, relatively low mammalian toxicity and non-residual only materials can be used in compliance with legislative and industry specific guidelines. Insects may only be actively mobile before or after pupation. Good housekeeping (deep cleaning) and vigilance of by staff is important. The risk of infested raw material (source, type and history) must be heeded and managed. Because some of these Pests can penetrate flexible packaging, finished product must be protected or isolated from infestation potential during storage, retail and after sale in the customers' care.

15.5.1 Integrated Stored Product Insect Management

It is clear that there are a number of factors involving both pest management and client personnel that need to be included in any Pest Management Plan. Early detection before infestations spread is essential. Where there is a high risk of Stored Product Insects infestation, an inspection and monitoring regime is necessary. Inspection must be for all life cycle stages. Larvae are generally the most destructive stage but less mobile stage. Adults are the dispersal and more mobile stage. Trapping with pheromone lures is useful for monitoring and mating disruption, but does have some limitations regarding specific species attraction.

Preventative methods are need to discourage and exclude Pests such as sanitation, elimination of Pest habitat and denial of access to buildings and product. Appropriate methods include:

- Site Risk Analysis and management plan.
- Pre-requisite programs (proofing, cleaning, sanitation, maintenance, stock rotation)
- Incoming goods inspection, segregation and quarantine procedure.
- Disposal or treatment of infested stock or goods.
- Pest detection (interception on incursion).
- Knowledge of pest biology and species behavioural patterns.
- Potential controls - Interception devices, suppression, and elimination.
- Ongoing inspection, monitoring, recording, analysis and reporting.
- Approved mechanical, physical and biological methods.
- Permitted/Approved substances and treatments
- Sufficiently robust packaging should be used to prevent invasion of penetrators.
- Regular site surveys, audits, review and evaluation of the above

Stored Product Insect Management Guide - Outside and Exclusion		
Reducing numbers of Stored Product Insects outside the food premises, and taking measures to prevent SPI entry inside, will reduce the potential for internal infestations to become established. Where exterior SPI activity is identified, some examples of common management tools and recommended actions to reduce insect numbers include:		
Prevention **Support Programs**: cleaning, storage, proofing, exclusion, building design, waste management, maintenance, inspection and quarantine		
Management Tool	**Considerations**	**Action/Methods**
Waste Management FOOD BUSINESS to do but PEST MANAGER to report /advise if not adequate	Dirty, open or overflowing rubbish skips containing exposed food waste are highly attractive to Stored Product Insects and other pests. Garbage areas are often close to production buildings and food storage areas.	Ensure that a policy of sealed waste is in place. Ensure waste skips are cleaned before delivery; and the skips are kept closed or and tightly covered except when waste is being added.
Building Maintenance, Exclusion and Proofing FOOD BUSINESS to do but PEST MANAGER to report /advise if not adequate	Cracked or missing tiles, poor wall surfacing and badly maintained fittings and production machinery and equipment can provide harbourage for Stored Product Insects.	Advise client of maintenance issues which are encouraging Stored Product Insects. Proofing/sealing off harbourage areas can be done by the food business or recommended and completed by the Pest Management company / technician. Check fixtures for small cracks and crevices and fill these. Close holes into the establishment from wall voids. Put mesh over drains.
Window and door screening FOOD BUSINESS to maintain	Where windows, doors or ventilation points need to be open, insect screens can prevent ingress of Stored Product Insects. There can be many other points where Stored Product Insects can gain entry through the fabric of a building into internal areas.	Where appropriate, install tight fitting insect screens or screen doors and ensure that they are maintained in good condition. Ensure exhaust fans and ventilation outlets have insect mesh installed over the openings. Seal off gaps around penetrations (service pipes, electrical conduits, conveyor belts etc) in walls, ceilings and floors.

Door and window seals FOOD BUSINESS to maintain	When doors or windows are not completely sealed and gaps exist, Stored Product Insects may pass through the gaps to gain entry inside.	Ensure that all windows and doors provide no gaps when closed or around the edges of the screens. Ensure that seals on windows and doors are maintained in good condition. Install draft excluders along the bottom of doors where gaps exist.
Door opening and closure FOOD BUSINESS to maintain	Minimising the time doors and windows Remain open, reduces the probability of Stored Product Insects entering the premises.	Where appropriate, fit self-closing or 'auto open and close systems' to doors and ensure that the 'open time' is minimised.
Cleaning external drains, sumps and pits. FOOD BUSINESS to do but PEST MANAGER to report /advise if not adequate	Waste or spillage of a food origin in these areas provides attraction, harbourage and breeding mediums for pests and may also become a source of Pests and bacteria.	Surfaces and drainage cavities that are not self-cleaning may need manual removal of built-up food residues and matter. This should be part of the regular documented cleaning regimen by the food business.
Building Exteriors and Surrounds **FOOD BUSINESS to do but PEST MANAGER to report /advise if not adequate**	Some species of Stored Product Insects are attracted to bright light. External bright lighting mounted on building exteriors can attract these pests toward the buildings from the outside environment. Some species of adult Stored Product Insects are attracted to flowering plants, particularly Coleopteran (beetle) species, which feed on flower nectar. Some Food Businesses inadvertently provide breeding sites for Stored Products Pests outside their premises.	Where possible, locate external lighting so that It faces towards the building (e.g. on poles separated from the building). Where practical, substitute mercury vapour globes (which give off bright white light), with Sodium vapour globes, which emit a softer, duller yellow light which is less attractive to flying insects. Flowering plants close to food business buildings should be discouraged. Some examples are: -Weigh stations and grain dumps -Gardens and excessive vegetation

Importing Stored Product Insects in on incoming goods **Inspection and Quarantine** FOOD BUSINESS to do but PEST MANAGER to report/advise if not adequate	It's a common occurrence that when Stored Product Insects appear in a food handling facility, they are often transported in on food based product deliveries. When this occurs, the risk of pest infestation / cross-infestation to 'clean' produce already stored becomes extremely high. So, any infested food based goods must be isolated from other stock as a matter of priority.	It is crucial for food businesses to develop and maintain a documented pest related 'Inspection and Quarantine Procedure for Incoming Goods' of food origin or goods containing food ingredients when delivered, unloaded and/or stored. All staff should be regularly trained in and fully familiar with this procedure and a Record of Training be kept and updated. The location of the designated Quarantine Area for segregation of infested goods should be outside,
Importing Stored Product Insects in on incoming goods **Auditing of Suppliers** FOOD BUSINESS to arrange but PEST MANAGER may provide the audit services	Where Stored Product Insects appear suddenly and the Pheromone Program has not recently recorded activity which coincides with the species causing that activity, suppliers and/or logistics firms may be the source of the sudden pest numbers following a delivery.	Conduct audits of suppliers and the logistics companies which warehouse, transport and deliver the food based goods.

When Stored Product Insect numbers build-up in areas outside but in close proximity to the food premises, the insect activity and the breeding/harbourage sites demand attention. This may include insecticidal treatments. Some examples of common management tools and recommended actions to reduce insect numbers include:		
Stored Product Insect Management Guide - Outside Chemical		
Management Tool	**Considerations**	**Recommended Actions**
Insecticide treatment of insect activity sites outside buildings and storage facilities PEST MANAGER	Treatment of observed infestation with residual insecticide, can reduce Stored Product Insects including insects such as psocids (book lice) mites, in addition to other insects (not strictly SPI's but potential contaminants).	Determine if Stored Product Insects are utilising external building surfaces and other areas as resting sites. Where appropriate, apply ~~a~~ residual insecticides registered for the purpose and which conforms to the food sites' approved chemical list.
Elimination of external breeding sites FOOD BUSINESS to do but PEST MANAGER to report /advise if not adequate	Some Food Businesses inadvertently provide breeding sites for Stored Products Pests outside their premises. Some examples are: 1. Weigh stations and grain dumps; 2. Dirty drains; 3. Elevators and conveyance. These sites need to be identified and spillage minimised.	1. Prevent or clean spillage immediately. 2. Ensure that a regular program of thorough cleaning of external drains and sullage pits is in place (see table above). 3. Ensure that a regular program of waste management is in place (see table above).

Effective and properly structured **Support Programs** are crucial to the success of an IPM Program, throughout external and internal areas. Internal **Support Programs** include cleaning, storage, proofing, exclusion, building design, waste management, maintenance, inspection and quarantine. Examples follow:		
Stored Product Insect Management Guide – Inside Non Chemical		
Management Tool	**Considerations**	**Recommended Actions**
Reducing Food Sources within the premises FOOD BUSINESS to do but PEST MANAGER to report /advise if not adequate **General Sanitation and Cleanliness**	Stored Product Insects are attracted to suitable food sources. Discarded food, food scraps and spillage can attract and sustain pest populations. Even small amounts of raw material or product residue can support a breeding cycle of SPI. Larval feeding stages remain fairly immobile and less likely to be trapped or dosed with insecticide and hence eliminated.	Good housekeeping and sanitation. Ensure a regular cleaning regime is maintained including a less regular intrusive deep clean in obscure areas which are 'out of the way' and not normally included in the daily/weekly cleaning schedule. This should include electrical wiring conduits, cable trays, food hoppers, exhaust ducting and other areas where food residues accumulate. Industrial wet and dry vacuums are very useful. Ensure that a regular program of thorough cleaning is in place. A deep cleaning schedule is necessary to prevent Stored Product Insects completing their life cycle.
Warehousing / Storage FOOD BUSINESS to do but PEST MANAGER to report /advise if not adequate	Food residues/spillage resulting from damage to food ingredient packaging during transfer and storage to pallets etc, creates a ready food source for SPI's. Sub-standard storage practices creates inaccessible pest harbourage and breeding sites for pests. Movement of food products inside may cause carry-over / transfer of Stored Product Insects from storage areas to production lines.	Spillage should be cleaned up immediately and damage to food packaging attended to as soon as it occurs. Ensure stored food is elevated up from the floor (300mm minimum) and away from any adjacent walls (500 mm), permitting access for regular cleaning and inspection and pest treatment when necessary. Create easy access to clean. Store bulk food ingredients in well sealed silos and containers.
Internal temperature and relative humidity (R/H) control. FOOD BUSINESS to do but PEST MANAGER to report /advise if not	High Relative Humidity and warm ambient temperatures are highly conducive to rapid stored insect population growth.	Where possible, maintain storage facilities at or below 16°C and Relative Humidity at 40% or less. This will be dependent upon several contributing factors including building design and insulation, modified temperature control (air-conditioning, fans, etc) and food product (raw or packaged).

Packaging FOOD BUSINESS	Stored Product Insects are attracted to suitable food sources by food odours or residues. Several species can penetrate various types of packaging by chewing through. These include adult weevils, adult lesser grain borer, adult tobacco and drugstore beetle, adult and larvae of the warehouse beetle and Cadelle. Also the mature larvae of some pyralid moths (Indian Meal, Raisin and Rice moths).	Sufficiently robust packaging can prevent infestation in most retail, catering and domestic storage situations. With these species, there is a risk of cross infestation with other packaged products.
Filtration and Exhaust lines cleaning and maintenance FOOD BUSINESS	Poorly designed and serviced building production line exhaust ductwork and filtration machinery permit accumulation and fallout of food residue that attracts and supports Stored Product Insects and creates harbourages for breeding which can be difficult to inspect, clean and treat.	Ensure that a regular documented schedule of cleaning and maintenance of exhaust outlets, ductwork and filtration machinery is in place and that the outlets are adequately screened and cleaned. The intervals should vary according to climate, type of food product, age and condition of facility and production equipment/machinery, volume of production and access. As a guide however, service/cleaning frequency should not exceed MONTHLY.
Rubbish Management FOOD BUSINESS to do but PEST MANAGER to report /advise if not adequate	Dirty, open or overflowing garbage bins containing discarded grain, seed and cereal waste or product in all internal areas of a food business invariably attract and support pest infestations, including Stored Product Insects. Garbage areas are often close to food production and storage areas.	Ensure that a policy of well sealed and maintained garabge/waste bins is in place. Wherever possible, position food waste bins away from exposed food and production lines.

Inspection and Monitoring Even with the most structured and stringent support programs (prevention) in place, stored insect pests may still find a way to enter food premises and then damage and contaminate food. To manage this, there needs to be structured and continual monitoring, surveillance and inspection procedures in place, which must be documented and reviewed regularly.		
Stored Product Insect Management Guide - Inside Surveillance		
Management Tool	**Considerations**	**Recommended Actions**
U.V. Light Traps Pest Manager	Commercial traps are available which utilise ultraviolet light to attract some but not all Stored Product Insects. U.V. light units work well with pyralid food moths and some beetle species such as Cigarette Beetle and Lesser Grain Borer. U.V. light units do not work with Spider beetles, Saw-Toothed Grain Beetle, Granary Weevil, Confused Flour Beetle (none of these fly). The Cadelle and Hide Beetle can fly but are not attracted to U.V. light.	Install light traps in all internal areas of the Food Business where flying insect infestation has been experienced. Data recorded can also help monitor SPI. Pheromone lures can be added to the trap. Location/positioning principles of UV light units for flying insects should be used as a guide for positioning the units for Stored Product Insects. Light trap positioning specs for stored product insects is different to the specs for flies. Height is the main contrasting difference. Stored Product Moths often congregate at ceiling height, whereas the house fly hovers around 1.5 to 2 metres up from the floor.
Pheromone Lure and Food Attractant Traps **Pest Manager**	Traps are installed for the target risk species at intervals appropriate to the mobility of the life stage (generally adults). A risk management approach is necessary with good understanding of the Pest biology and habits. A range of traps are available that use synthesised insect pheromones and/or food attractants which are species specific. These lures may be sexual pheromone based which attract only males or aggregation pheromones which are not gender specific.	Pheromone traps should be secured in place, numbered and reflected on the site map (similar to other Pest Management devices like rodent stations and UV light units). Pheromone traps should be of the catch pad type. Catch numbers and species should be recorded on Pest Monitoring Reports. As a general guide, pheromone traps installed for monitoring should be positioned on grid patterns at 15 metre intervals for flying species and 8 metre intervals for crawling species.

	Traps are installed for the target risk species at intervals appropriate to the mobility of the life stage (generally adults). A risk management approach is necessary with good understanding of the Pest biology and habits. A range of traps are available that use synthesised insect pheromones and/or food attractants which are species specific. These lures may be sexual pheromone based which attract only males or aggregation pheromones which are not gender specific. These may be single or multi-species. They may be purely mating disrupters and a monitoring tool (usually) rather than a control in their own right. Some traps contain food attractants only for species where a specific pheromone has not yet been synthesised or is too difficult or costly to produce.	Pheromone traps should be secured in place, numbered and reflected on the site map (similar to other Pest Management devices like rodent stations and UV light units). Pheromone traps should be of the catch pad type. Catch numbers and species should be recorded on Pest Monitoring Reports. As a general guide, pheromone traps installed for monitoring should be positioned on grid patterns at 15 metre intervals for flying species and 8 metre intervals for crawling species. Stored Product insects with short adult lifespans are generally more responsive to pheromones (but sex pheromones specifically) and may become confused or repelled if traps are positioned too close together. Preferably, SPI activity thresh-hold levels should be established to serve as trigger points for additional control measures to be implemented eg: ramped up inspection and monitoring, space treatments, etc. Catch Data must be continually recorded and evaluated for immediate response initiation and for trend analysis which is crucial for future improvement planning

Treatment and Eradication When Stored Product Insects gain entry into a food facility or infestations have been identified, some examples of appropriate management tools and recommended actions to eliminate or minimise the insect pests include:		
Stored Product Insect Management Guide - Inside Chemical		
Management Tool	**Considerations**	**Recommended Actions**
Insecticide treatment of insect activity inside buildings and storage facilities Pest Manager	Targeted and strategic treatment of insect and arachnid pests with residual insecticide to localised and/or targeted internal areas of the premises, can significantly reduce Stored Product Insects, flies, crawling insects and arachnids (mites and spiders) which are all potential contaminants, inside).	Determine if Stored Product Insects, flies and other pest species are utilising internal building surfaces as resting sites and cracks and crevices as harbourage. Where appropriate, apply a residual insecticide registered for the purpose and which is listed on the Approved Chemical List for the site.
Insecticidal Dusting Pest Manager	Certain dusts can be used with pesticide properties. Some are mechanical in nature, which erode the cuticle of the insect causing desiccation. Some 'mechanical' dust formulations are registered to use for direct treatment of stored grains and grain storage vessels and equipment eg. *Diatomaceous Earth* Other dust formulations incorporate insecticidal ingredients which are suitable to treat cavities and voids where safe to do so.	Insecticidal dusts are best used in cavities and voids to control adult Stored Product Insects and other insect pests, whereas mechanical dusts can be used around production and packaging machinery. Dusts are mobile and should not be used where there is a risk of food contamination. Product label directions should always be followed. Suspended ceilings should not be treated with insecticide dusts due to potential fall-out and dusts should not be used near food or food preparation surfaces.
Precision insecticide spraying Pest Manager	Careful targeted spot, crack and crevice treatments can be useful to arrest localised Stored Product Pest occurrence in sensitive food handling areas.	The success is dependent on adequate access and cleaning of loose or impacted residues. Only registered and approved substances can be used and with due consideration for preventing food contamination.

Auto-aerosol/space sprayers Pest Manager or Food Business to maintain	Auto-aerosol spraying devices are available which dispense a measured dose of aerosol insecticide at timed intervals into the air. Only pyrethrum formulations should be used as these have low mammalian toxicity but are moderately effective against Stored Product Insects. In the short term, these devices kill nearby insects. Experience shows location, reticulation design, distribution and maintenance are critical to achieve a useful effect.	These devices have limited value in most situations. Install auto-sprayers in internal areas of the Food Business where flying insect (including SPI) infestation has been experienced but NOT in exposed food areas or where food is being consumed. These devices are only effective if they are properly designed, located and maintained and should not be relied on as a sole control measure. Generally and at best, only adult flying insects may be knocked down if they contact with the small spray pattern during dispersal/migration. The most appropriate situation for these timed aerosol spray units is over the top of internal garbage bins.
Space Treatment Pest Manager	Treatment of a food processing or storage environment with ultra-low volume (ULV) finely atomised droplets containing approved pesticides can be useful for containing and preventing SPI cross infestation. It is not acceptable for most pesticides to come into contact with raw materials or food product. Re-entry of unprotected personnel to treated areas must be prevented until air borne insecticides are below the relevant threshold for safe ongoing occupancy (exclusion periods). A written SOP or SWMS for space/misting treatments should be developed by the pest service company either separately or as part of the larger comprehensive SWP or SWMS for Pest Servicing of Food Handling Sites.	ULV or cold foggers (2-30 micron droplets) or in some cases misters (20-80 micron droplets) can be used to dispense aerosols of approved pesticide. These can achieve 3 dimensional dispersal throughout the environment. These small droplets eventually deposit on surfaces or evaporate within the air space. Thermal smoke foggers emit insecticide impregnated smoke droplets, the approximate size of .1 micron. This type of space treatment has superior penetrative qualities but on the negative side, can create issues with neighbouring properties and the fire brigade as a result of smoke billowing form the treated premises. This Safe Work Practice should include detailed site preparation, insecticide application, exclusion, ventilation and clearance procedures involved with space/misting treatments. This document should be available to the food business management.

Stored Product Insect Management Guide - Inside with Temperature Control		
Management Tool	**Considerations**	**Recommended Actions**
Heat FOOD BUSINESS to do in collaboration with PEST MANAGER	Cooking or baking will kill all life stages of Stored Product Insects if temperatures are sufficiently high and of long enough duration. The higher the temperature the shorter the duration required. The product core must also reach the designated temperature for the required duration. Lower temperature of longer duration can be used to disinfest some raw material without affecting the quality. Before heat is used for disinfestation, the potential for heat damage to the food commodities must be evaluated. With many SPI infestations, the interior of the food production/storage facility needs disinfection as opposed to the bulk stored commodity itself (wheat, rice, maize, etc). However, insects are often not exposed and are protected and insulated against extremes of temperature by building fabric, food commodity, packaging, production equipment and so on. So higher heat temps are necessary to penetrate these insulative obstructions and actually affect the target pests.	When using heat as a means of disinfestation, the process must be done in the early stages of infestation, as any visible presence of pests will still be objectionable and unacceptable in finished food product. Fields (1992) reported the following generalised response of **exposed** Stored Product Insects to elevated temperature: Above 62ºC - death in < 1 minute 50 - 62ºC - death in < 1 hour 45 - 50ºC - death in < 1 day The lethal mortality heat temperatures for the various SPI species vary considerably but generally speaking is around 48ºC for 24 hours for **'exposed' insects.** There is much conjecture about the 'ideal' temperature and exposure times. However, the potentially most effective formula for heat treating stored product insects within a structure like a food production plant is 60ºC for 24 hours. Just like fumigation, heat treatment relies on maintaining the lethal temperature consistently for the required time.

Freezing FOOD BUSINESS to do in collaboration with PEST MANAGER	Low temperatures will kill all life stages of Stored Product Insects if temperatures are sufficiently low and of long enough duration. The lower the temperature the shorter the duration. The product core must also reach the designated temperature for the required duration. This technique may not be suitable for all raw materials or products due to deleterious effect on quality. Other issues such as condensation on warming may damage packaging etc. With many SPI infestations, the interior of the food production/storage facility needs disinfection as opposed to the bulk stored commodity (wheat, rice, maize, etc). Just like heat and fumigation, freezing treatment relies on maintaining the lethal temperature consistently for the required time.	Constant temperature time period required for cold temperature disinfestation varies with species and acclimatisation factors. -5°C - death in 12 weeks -10°C - death in 8 weeks -15°C - death in 4 weeks -20°C - death in 1 week The rapid lowering of temperatures achieves better results with insect mortality, as opposed to slow lowering of temperatures (which permits the target insects to acclimatise easier). Insects are often not exposed and are protected and insulated against extremes of temperature by building fabric, food commodity, packaging, production equipment and so on. The POTENTIALLY most effective formula for cold treating EXPOSED stored product insects within stored food product itself is -10°C for 1 week or -20°C for 24 to 48 hours.

Stored Product Insect Management Guide - with Fumigation		
The whole subject of fumigation is complex and is gradually evolving (although shrinking) in response to safety and environmental concerns. Many of the 'traditional fumigants' such as methyl bromide, hydrogen cyanide and chloropicrin are restricted or have been phased out. Fumigation can be extremely effective but at the same time, risky, and the subject is arguably deserved of a whole separate book. Suitable space for the whole subject is not provided in this publication. However, the following is a very brief general summary of fumigants currently in use in Australia for fumigation of foodstuffs, associated equipment and storage vessels.		
Management Tool	**Rationale**	**Recommended Actions**
Fumigation	This is the use of gaseous substances (fumigants) that are toxic to, and kill all life stages of Stored Product Insects in raw materials, food product or in some instances, food handling premises and equipment. The fumigant must be such that it does not leave unacceptable residues that could impact on consumer health. There are very specific preparation, application, monitoring and clearance procedures involved with fumigation of goods.	Fumigation must be done in gas proof enclosures to contain the gas at the necessary concentration for long enough to achieve mortality. The packaging and the product material must be able to be uniformly penetrated to where the Pests are residing. Impervious packaging or density and depth of product may impede this. Fumigation is a specialised process and beyond the scope of this code. A fumigator's license is legally compulsory for anyone involved in the fumigation of products and there are specific with-holding periods on food products and equipment after fumigation is completed.
Fumigants in general	**Positives** - No residues (compared to residual pesticides) - Exceptional penetrative qualities (gets Into the smallest and tightest areas) - Broad spectrum of activity (usually Controls all forms of life)	**Negatives** - Safety risks and hazards - Containment - Possible damage to commodities and Structures - No ongoing control (one off treatment – Then and there with no residual action)

Phosphine (Aluminium Phosphide and Magnesium Phosphide) Minimum exposure – 7 days @ above 25 degrees OR 10 days @ 15-25 degrees Ventilation – 1 day fan assisted with 2 days with-holding period 0R up to 5 days ventilation without fans plus 2 days with-holding period Total minimum turnaround time application, exposure, ventilation and with-holding is 10 to 15 days in ideal conditions (25 degrees or above)	**Positives** - Good penetrative qualities (which makes It hard to contain in a fumigation space). - Product of choice for bagged flour, cereals, grains, dried fruits, etc. - Gets absorbed readily by products and materials. However, this can present a hazard where flour and grains hold an odour or residue. - Operator must be a licensed fumigator.	**Negatives** - Slow acting (compared with methyl Bromide or sulfuryl fluoride) so not usually used for quick turnaround of product. - Flammability risk at high concentrations - So, not ideal for production plants but Better suited to bulk storage - Egg stage of lifecycle can be tolerant to Phosphine - Well documented resistance due to sub Lethal doses from leakages in field conditions (India and Pakistan) - Can react (corrode) with copper
Sulfuryl Fluoride Exposure time is normally 24 hours on average 24 hour with-holding period on foods treated Total turnaround time can be as quick as 48 hours	**Positives** - Traditionally used in structural Fumigations for drywood termites – 'Vikane' - Suitable for factories (structural), food storage areas and food production equipment - Non-corrosive to metals / non-explosive -No documented resistance *(Bell et al.2003)*	**Negatives** - Egg and pupal stages of lifecycle can be tolerant to Sulfuryl fluoride – Does not penetrate but combines with protein in the egg shell and embryonic membranes *(Outram 1967)* - Operator must be product accredited and

Ethyl Formate	**Positives**	**Negatives**
Product example: 'Vapormate' From BOC Available in 6kg and 31kg cylinders	- Naturally occurring in food - Rapid breakdown of residues into natural products - Potential to be used as a space spray - Currently registered for control of adult stages of certain pests by fumigation in some cereal grains, oilseeds and dried fruit in Australia - Ideal for fumigations of 50 to 200 tonnes - Operator must be product accredited and licensed fumigator	Ethyl Formate does not penetrate well, although CO2 enhances this Ethyl Formate is flammable but is mixed with liquid (pressurised) CO2 to reduce flammability. Although this also synergises (enhances) the results

15.6 Birds

Bird management can be a very complex process involving a wide range of techniques.

The management process can be further complicated by the fact that much of the work is performed at heights, whereby all necessary safety precautions must be adopted. All Pest Managers employed to do this work, must have adequate experience in this field and is be aware of all safety requirements.

Conduct a site specific risk assessment to identify and minimise any potential risk to people, non-target species and the environment.

Another problem of concern is the highly emotive nature of bird management, especially when native species are involved. It is imperative that any Pest Manager is fully cognizant of all relevant legislation and has obtained any permits required.

It is not uncommon for people to raise objection to removal of birds by baiting, trapping or shooting. It often proves essential for biological, emotional or commercial reasons, that control measures are carried out in non- business hours, usually early morning or late evening.

It is a legal requirement that all birds are treated in a humane manner and disposed of according to Animal Welfare Acts.

Reasons for Management

Birds are a hazard to Food Businesses principally because:

Health Risk – Birds, bird droppings and nesting materials can carry many different diseases which may be transmitted to humans. Ectoparasites e.g. Bird mites can cause extreme annoyance to building occupants; Ornithosis, Salmonella, Cryptococcis (which can lead to meningitis), whereas Indian munas can carry avian malaria. Also fungus based respiratory diseases such as Histoplasmosis and Aspergillosis are associated with bird droppings (pigeon droppings)

Property and Equipment Damage – Bird droppings are acidic and will corrode many surfaces requiring restoration or replacement

Food production - Droppings, nesting material, feathers and dead birds can contaminate food products are various stages of production and packaging

Finished Goods Damage – Droppings, nesting material, feathers and dead birds can foul finished goods causing their rejection by clients

Encourage other pest activity – The presence of birds attracts and perpetuates other insects e.g.: birdmites, cockroaches, psocids, mealworms, etc

Poor Image – Birds roosting on a building or droppings on ledges and footpaths all convey an impression of a business not concerned with the welfare of its customers

Slip Hazard – Bird droppings can be slippery and cause customers or staff to fall, possibly resulting in legal action

Economic Damage – The need to clean up bird droppings and other debris on a regular basis can result in unnecessary cost

Noise – Roosting birds, particularly starlings can produce alarming levels of noise making it very unpleasant to remain in the area

Employee Dissatisfaction – Staff should not be expected to work in areas which are unsafe or unhealthy

15.6.1 Main Pest Bird Species

In Australia and New Zealand, there are many Pest birds. The most significant in this category are exotic but an increasing number in urban areas are native species. Some native species have long been considered agricultural Pests.

Some examples of the exotic Pest species are:

- Pigeon
- English House Sparrow
- European Starling, and
- Indian Mynah.

Some examples of native species which can be Pests are:

- Silver gull or Seagull
- Sulphur Crested Cockatoo
- Corella (Little and Long-billed species)
- Australian White Ibis, and
- Welcome Swallows
-

There are different policies for the treatment of exotic and native species. Treatment methods which can be used against exotic species may be illegal for native species. Permits/licences may be required for native species from appropriate government departments, e.g. National Parks and Wildlife Service (Aust) or the Department of Conservation (NZ).

In the case of native species, an officer from the authority may have to carry out a site survey before any treatments can be sanctioned NZ and Australian State and Territory authorities have varying regulations relating to bird control.

The strategies which need to be employed for effective bird management are many and varied. They depend upon the particular Pest species, the roosting/nesting locations, the population density, “bird pressure” and the situation / type of premises. “Bird pressure” can be defined as the “level of commitment” of the individual bird or flock to visit an area and their desire to reclaim their former territory after bird management techniques have been put in place.

A site with food, water, shelter and suitable protected spaces for nesting offers high bird pressure, as do locations and buildings where generations of pest bird species Open spaces with limited shelter from exposure to rain and full sun represent the lower end of the bird pressure scale.

15.6.2 Bird Management Strategies

There are two contrasting approaches to bird management:

1. Alter the environment (roosting/nesting sites) to make it unattractive or impossible for birds to utilise or,
2. Remove the birds from the environment by trapping, baiting and shooting.

Which strategy is undertaken depends upon a range of factors including:

- An understanding of the target pest bird habits and biology is essential.
- The susceptibility of the particular species to the proposed method;
- The nature of the building involved;
- The location of the building. e.g. shooting of birds in the middle of a business district may not be appropriate.
- A cost to benefit analysis

Recommended action for bird management programs:

- Conduct a site specific risk assessment to identify and minimise any potential risk to people, non-target species and the environment.
- Ensure no foodstuffs are available to attract birds to the area.
- Discourage staff from leaving food scraps in eating areas.
- Remove potential nesting materials from the site.
- Remove bird droppings to avoid possible disease transmission.
- All tree branches overhanging buildings should be trimmed.

15.6.3 Alteration of Environment - Exposed Ledges/Lights/Tanks/Gardens

Bird Management Guide – Non Chemical	
Management Tool	**Considerations and Guidance**
Bird Spikes	Installation of polycarbonate**,** alloy or stainless-steel spikes on ledges, conduits, flat surfaces and other perches will prevent pigeons from roosting on those sites. This system is effective when bird pressure is “Light” to “Heavy.” It is relatively easy to install (depending upon access) and long lasting. It is considered to be the most cost effective and long term solution for deterring birds from landing.

Bird Wire	Installation of nylon coated wire tensioned between stainless steel posts will create an unstable landing area, deterring pigeons, seagulls and larger species. This system is effective when bird pressure is "Light" to "Medium." It is long lasting but takes longer to install than bird spikes. It is a relatively low cost system with a low visual impact.
Bird Slope	Installation of a PVC triangular shaped strip to ledges turns them into "slippery slopes" and prevents birds from roosting or nesting thereon. This device is effective against all species and suitable when bird pressure is "Light" to "Heavy."
Repellers	These basic devices consist of a cylindrical platform with stainless steel rods protruding from the centre of the unit in a circular array. The rods wave in the wind making the surface unattractive for birds to land. They are only suitable for large birds such as pigeons and seagulls and can be installed on the tops of street lights, air conditioning units, water tanks and boats. There are also solar powered units available. These systems are relatively easy to install. They are effective when bird pressure is "Light" to "Medium."
Optical Bird Scarer	An optical bird scarer that harmlessly deters birds from unwanted areas by making use of light beams reflected from direct sunlight or artificial light. The reflective pyramid rotates via an electric motor, sending the beams around in a menacing pattern. The light spectrum reflected back by the product disorients birds in flight by limiting their vision significantly and by imitating the disruption to ambient light transmission caused by predator birds like hawks and eagles. This causes the bird to deviate in flight and fly to another destination. It has been effectively used in a wide range of situations for the control of an extensive variety of pest birds but can produce poor results in situations where the offending birds were born on site (eg. Pigeons and even sparrows) and are extremely reluctant to move location.
Electrified Shock Systems	A range of such systems are available which work on the principle that birds are rapidly deterred from landing by experiencing an electric shock. Power to these units is supplied by mains electricity or solar panels. The system is low profile and relatively quickly installed (depending upon access). Often in the form of pliable stripping, it is effective against all bird species and all bird pressures.

Management Tool	Considerations and Guidance
Scare Eyes/Owl or Falcon Bird Scarers	These durable plastic devices are balloons with large eyes or models of owls and falcons. They **may** deter birds from entering an area in which they are displayed. Results vary and are often limited as the birds become conditioned to their appearance. They are more effective when moved to various locations and when combined with other deterrents. They should only be used in "Light" pressure situations.
Distress Calls	Distress calls are made when birds are under duress and serve to frighten birds of the same species from the area. Recordings of distress calls can be played back through an audio systems. They are mainly effective against species which are good communicators e.g. starlings, seagulls, cockatoos. They are not effective against poor communicators e.g. pigeons, sparrows or swallows. Birds will become tolerant of distress calls after a period of time unless they are supplemented by other measures such as "Scatterbird" or shooting. As the distress calls are repeated *ad infinitum*, workers and residents may object to the noise.

15.6.4 Enclosing Areas

Management Tool	Considerations and Guidance
Bird Netting	Bird nets are available in a variety of sizes and colours and can be used effectively in areas such as warehouse awnings, loading docks, breezeways, complex building structures and other covered areas which provide birds with nesting opportunities. Courtyards can also be netted to prevent birds from entering the area. Installation is a lengthy process and can be quite expensive. On the positive side, bird nets should last for 10 years or more. All pest species can be prevented using netting and it is effective with any level of
Vinyl Strip Curtains/Doors	Vinyl strip curtains or doors are used in passageways of personnel or material handling equipment premises and are primarily designed to minimise noise or dust and maintain a constant interior temperature but also serves to prevent the entry of birds. These devices are effective against all bird species when fitted and used correctly.
Trapping	Various sized traps which are often species specific are available depending on the pest species. All traps should be checked daily and sufficient food, water and shelter must always be available. Birds must be humanely disposed of after trapping according to the Animal Welfare Acts. No permit is required to trap exotic species. More details may be available on the state authorities' websites.
Shooting	Shooting is commonly carried out using a high powered air rifle and local police must be notified before proceeding. Two people are normally in attendance during the process. The designated shooter must have the appropriate Firearms Licence. Shooting should take place after hours, in a controlled environment, when no unauthorised personnel are in attendance. A risk assessment must be conducted and risks minimised before any shooting commences.
Mist Nets/Cannon Nets	These methods are not permitted by law to be used for management programs. In NZ these may be applied with the permission of the Department of Conservation.

15.6.5 Bird Removal/Reduction

Bird Management Guide - Chemical	
When other bird control methods fail, there are chemical methods that maybe considered. However, there are strict guidelines and restrictions which must be adhered to when using these options. Generally speaking, there are three types of chemical products available: • Avicides – Ingested Poisons (still registered for use but with strict compliance requirements) • Contact Avicides (phased out – use is illegal – not permitted under this code) • Chemical Contact Deterrent Gels (still available but discouraged and with some compliance requirements)	
Management Tool	**Considerations and Guidance**
Ingested Poisons **Alphachloralose**	Alphachloralose is a "soporific" (narcotising) i.e. an agent which lowers the metabolism of warm blooded animals and can cause them to fall asleep. In cool temperatures, the animals can lose so much heat to the environment that they die of exposure. Alphachloralose can be mixed with a suitable food medium e.g. wheat or millet, and placed for consumption by target species such as pigeons and sparrows. Native birds which eat the bait should survive if kept warm. Baiting is carried out in the early morning or late afternoon when premises are empty and when no bystanders are in the area. Permits* from state authorities are often required to use this product. Special permission must be sought when using it against native species. In NZ this product is approved and must be used according to the label. Bird control programs using Alphachloralose (as with most other bird feeding agents) can take several days to weeks to complete successfully, which includes the 'free feeding' phase. **** Permits are required in some states***.
Amino pyridine ("Scatterbird")	"Scatterbird" is a toxic compound which induces distress symptoms in birds consuming it. Some of the birds which eat the bait will die but may scare other birds from the area whilst succumbing. Species which are good communicators e.g. seagulls, crows, starlings, indian mynahs are most readily affected. Permits* for the use of this product must be obtained from the state authorities. Special permission must be sought when using it against native species. In NZ this product is not registered for use. Treatments are carried out in the early morning or late afternoon when premises are empty and when no bystanders are in the area. Bird control programs using Amino Pyridine (as with most other bird feeding agents) can take several days to weeks to complete successfully, which includes the 'free feeding' phase.

Chemical Contact Deterrent Gels	There are several bird repellent gels available, which use sticky oil / petroleum based soft glues as a deterrent factor and which can be applied to ledges, sills, pipes, etc. When birds land on these sticky gels, it produces a feeling of instability under foot, with very uncomfortable sticky residues remaining on any part of the bird's body including feet, feathers, etc. Also, the gels tend to attract dirt, dust, and other insects, and become clogged with bird feathers and droppings each time a bird lands on the sticky residue. As a result, the filthy, sticky, bacteria impregnated coating becomes ineffective and must be cleaned off the surfaces and then a new coating re-applied. This can be a continuous process, which does not address the bird problem professionally. It often results in poor outcomes and disgruntled customers. **Chemical contact deterrent gels are not recommended under this code** due to potential harming of smaller bird species like swallows from the gel gluing their feathers and wings together, often preventing flight and interfering with maintenance of normal body temperature.

15.7 Larger Vertebrate Pests: Cats, Foxes, Wild Dogs, Possums, Stoats and Rabbits

Cats, foxes, possums, stoats, rabbits and wild dogs are known carriers of disease and bacteria. They are contrary to food safety standards in general and should not be present within food production or storage areas.

Exclusion with suitable fencing and for possums, proofing, are the first steps in preventing access. Discouraging feeding of Pest animals by site personnel is also important, as is minimising access to available food sources and harbourage. If the larger vertebrate Pests cannot be built out or driven away, the Pest Manager**s** will need to implement a trapping regime.

A trapping regime will use a non-injury causing live catch trap. Pest animals shall be handed over to an appropriate animal welfare shelter.

Note: In Australia possums are a protected native species and it is an offence to relocate them to another area as these animals are often territorial and newcomers are not accepted. In these instances**,** exclusion and deterrence is the only option. In NZ possums, are not a protected species and are not subject to any specific protection other than the Animal Welfare Act.

15.8 Termites

Termites are commonly, but incorrectly, called white ants. They are social insects that live in a colony like ants or bees. Their diet is cellulose for carbohydrate and fungus for protein, so they seek wood, cardboard and paper. They are present throughout Australasia.

The most frequent, and expensive damage is to structural timbers. In food manufacturing and storage areas, they may also attack packaging material eg: cardboard and timber pallets. Alates (winged termites) may cause contamination of food.

Typically, termites which are found will predominantly be worker termites seeking food. Killing these will not affect the termite nest nor reduce the risk of ongoing damage. Identification of the termite species is important in the eradication decisions.

If a Food Business discovers termites they should:

- Leave the infested area alone and undisturbed. This includes the mud tunnels termites build over materials like brick and concrete through which they cannot tunnel through (unless there are cracks, penetrations or expansion joints).
- Barricade the area of infestation to prevent entry.
- Do not disturb activity and immediately contact a Pest Manager to attend the site – Note: ensure they are experienced in termites-control as not all are qualified or experienced to do this kind of work.
- Understand the implications and agree with the Pest Manager on the termite management program to be implemented.

Several options can be used to manage termites including baiting and application of Termiticides. Eradication without the use of chemicals is not possible although there are options (such as baiting) where the chemical is applied in a well-controlled and selected manner. The installation of non-chemical physical termite deterrent systems is only possible during construction of the building and not an option in existing structures.

16. TRAINING and ACCREDITATION OF PEST MANAGERS

Professional Pest Managers serving the food industry in Australia and New Zealand are commonly referred to as 'Urban' or 'Urban and Commercial Pest Managers' and their licensing and regulation is the responsibility of:

a. In Australia – a mix of state governments departments that are responsible for legislation relating to health, environment, chemical usage and/or WHS.
b. In New Zealand – The Environmental Protection Authority (Formerly the Environmental Risk Management Authority) that also has responsibilities similar to the APVMA.

In Australia, in the late 1990's, the state regulation bodies agreed on uniform national competency-based training standards for Urban Pest Managers. In most States and Territories the level required is the minimum necessary to obtain a Pest Manager licence and no further ongoing training is mandated.

In New Zealand Pest Managers must be qualified as an Urban Pest Management Contractor ("qualified UPM contractor") under the EPA Hazardous Substances (Hazardous Property Controls) Notice 2017, should keep a copy of their UPM qualification with them or a copy of their current PMANZ technician registration certificate and PMANZ identification card on their person always. *This needs confirming G.S.*

In both countries, training and assessment in Urban Pest Management is provided by government and/or private training providers that are regulated by a national training framework. The training that allows an individual to work as a Pest Manager is geared to facilitating entry into the industry and assumes that further skills and experience will be acquired on the job or added as an optional additional qualification later. As a result, the skill levels of Pest Managers varies widely and current training for entry to the industry cannot be expected to equip all Pest Managers to provide the quality of services defined in this Code.

Many pest management businesses provide training that goes beyond the basic entry level. In 2010, AEPMA introduced into Australia, a service quality accreditation scheme, "PestCert", which was representative of continuing professional development (CPD) scheme. The PMANZ encourages continuing development through its own training programs and conferences, as well as professional training organisations and suppliers.

It is the intention of the Working Party, which developed this Code, to define a curriculum of Core Training Elements. The foundation of the training elements is in the form of industry certified training directly aligned with this code. This will allow inclusion into the training frameworks that exist in both countries and will establish a mechanism for 'accreditation' of persons who complete the training. It is expected this would be part of a continuing professional development program and in this way, a pathway will be created for Pest Managers to specialise in servicing the food industry. Food businesses will then be able to identify Pest Managers who have been trained in food handling environment pest management at an enhanced level by reference to their accreditation certificate.

Food businesses should require that Pest Managers providing services to their organisation:

- Are signatories to this code
- Can provide evidence of the dedicated training completion by way of certification issued by AEPMA
- Can provide evidence that service staff undergo regular ongoing Code training
- Can demonstrate efforts to comply with Industry Best Practice as defined in the Code.

Training for Food Businesses

This Code continually stresses the need for Food Business staff and associates (eg. consultants, contractors, auditors, etc.) to understand the Code and to work co-operatively with Pest Managers in its implementation. Training required of Food Business staff will cover many of the same core areas as that of Pest Managers but from a different perspective and at a lower level. Part of the process of defining the core elements will be to concurrently define those required for Food Business staff. It is expected that these will be delivered as continuing professional development courses both externally and in-house.

17. DEFINITIONS

ACVM - Agricultural Compounds and Veterinary Medicines (NZ)

AEPMA - Australian Environmental Pest Managers Association Ltd.

Appropriate enforcement agency - an enforcement agency prescribed by the regulations under the Act for the purposes of enforcement of the Act or similar purposes.

APVMA - The Australian Pesticides and Veterinary Medicines Authority.

Authorised Officer - a person authorised or appointed under the Act or other legislation for the purposes of enforcement of the Act, or similar purposes, such as an 'authorized officer', 'environmental health officer' or 'inspector'.

Best Practice - involves the identification and adoption of current methods, equipment and products proven to best meet pest management objectives.

Both parties' organisations - the Food Business and the Pest Management Business.

Contaminant - any biological, chemical or physical agent, foreign matter, or other substances that may compromise food safety or suitability.

Control - measure that is modifying risk. The restriction of an activity, tendency or phenomenon.

Corrective Action - a short term or long term action taken to directly solve a problem or remove its cause.

Duty of Care - responsibility or the legal obligation of a person or organisation to take actions or to avoid acts or omissions (which can be reasonably foreseen) which are likely to cause harm to others.

Equipment - a machine, instrument, apparatus, utensil or appliance, other than a single-use item, used or intended to be used in or in connection with food handling and includes any equipment used or intended to be used to clean food premises or equipment.

EPA - The Environmental Protection Authority (NZ).

Food Business - a business, enterprise or activity (other than primary food production) that involves:

(a) the handling of food intended for sale, or
(b) the sale of food, regardless of whether the business, enterprise or activity concerned is of a commercial, charitable or community nature or whether it involves the handling or sale of food on one occasion only.

Food Premises - any premises including land, vehicles, parts of structures, tents, stalls and other temporary structures, boats, pontoons and any other place declared by the relevant authority to be premises under the Food Act kept or used for the handling of food for sale, regardless of whether those premises are owned by the proprietor, including premises used principally as a private dwelling, but does not mean food vending machines or vehicles used only to transport food.

Food Safety Program - a program set out in a written document retained at the Food Premises of the Food Business, including records of compliance and other related action, that:

(a) systematically identifies the potential hazards that may be reasonably expected to occur in all food handling operations of the Food Business;
(b) identifies where, in a food handling operation, each hazard identified under paragraph (a) can be controlled and the means of control;
(c) provides for the systematic monitoring of those controls;

(d) provides for appropriate corrective action when that hazard, or each of those hazards, is found not to be under control;
(e) provides for the regular review of the program by the Food Business to ensure its adequacy; and
(f) provides for appropriate records to be made and kept by the Food Business demonstrating action taken in relation to, or in compliance with, the food safety program.

Food Safety Standards - the standards contained in Chapter 3 of the *Australia New Zealand Food Standards Code*.

Good Manufacturing Practices (GMP) – Food Industry Practices to ensure that products produced meet specific requirements for integrity, quality and consumer safety.

Handling of food - includes the making, manufacturing, producing, collecting, extracting, processing, storing, transporting, delivering, preparing, treating, preserving, packing, cooking, thawing, serving or displaying of food.

Hazard Analysis and Critical Control Points (HACCP) - a Food Business process control system designed to identify and prevent microbial and other hazards in food production, based on seven principles: hazard analysis; critical control point identification; establishment of critical limits; monitoring procedures; corrective actions; record keeping and verification procedures. HACCP protocols form the basis for all major food safety management system standards.

Level of Risk - magnitude of a risk or combination of risks, expressed in terms of the combination of consequences and their likelihood.

SDS – Safety Data Sheet / SDS – Safety Data Sheet

MPI – Ministry for Primary Industries (NZ)

Non Residual Pesticide - Pesticides which have no residual activity.

Pest Management Contact – Food Business employee assigned to liaise with Pest Management Technician and/or Pest Manager.

PMANZ - Pest Management Association of New Zealand Inc.

Pest Management Business – a company or self employed business involved in providing Pest Management services to the Food Industry for a fee.

Pest Management Technician - a person qualified to perform pest management and in the context of this document is the person who conducts the work in the field.

Pest Management Technician's Licence - a full or restricted certification to use pesticides and/or manage pests held by Pest Management Technicians, issued by relevant State or NZ authorities.

Pest Management Program – a program to manage the Pest risk.

Pest Manager – a person who is knowledgeable in pest management and in the context of this document represents the pest management business engaged.

Pesticide - a substance used to manage pests and required to be registered by the Australian Pesticides and Veterinary Medicines Authority or Environmental Risk Management Authority (NZ).

Pests - include birds, rodents, insects and arachnids. The intention is to ensure that the

requirements cover all animals that could contaminate food either directly or indirectly. It is not restricted to the animals listed.

Post-Harvest - between the times of harvest to consumption.

Preventative Measures - measures put in place to prevent a problem from occurring or re-occurring.

Residual Pesticide – A pesticide which remains effective for some period of time after application.

Review – activity undertaken to determine the suitability, adequacy and effectiveness of the subject matter to achieve established objectives.

Risk – effect of uncertainty on objectives. A combination of the consequence of an event (including changes in circumstances) and the associated likelihood of occurrence.

Risk Assessment – overall process of risk identification, risk analysis and risk evaluation

Risk Management – refers to the architecture (principles, framework and process) for managing risks effectively. Coordinated activities to direct and control an organisation with regard to risk.

Safe and suitable food – food that will not cause harm to a person upon consumption according to its reasonable intended use.

SOP – standard operating procedure

SWMS – safe work method statement

JSA – job safety analysis

SWP – safe work practice

Validation - to establish the soundness of processes and systems.

Verification - to establish or confirm the truth or accuracy of a fact, adherence to validated processes and systems and their effectiveness.

18 REFERENCES

To be populated

19. APPENDICES

19.1 Australian New Zealand Food Standards Code – What Sections Apply to the Pest Management

The **Australian New Zealand Food Standards Code** describes requirements for food businesses and their contracted pest managers. The section of the code relevant to pest management is reproduced below:"
Standard 3.2.2 Food Safety Practices and General Requirements Standard
Division 6 — Miscellaneous

24. Animals and Pests
A Food Business must:

(a) Subject to subclauses (2) and (3) not permit live animals in areas in which food is handled, other than seafood or other fish or shellfish;
(b) Take all practicable measures to prevent Pests entering the food premises; and
(c) Take all practicable measures to eradicate and prevent the harbourage of Pests on the food premises and those parts of vehicles that are used to transport food.

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