

A Guide to Developing a Spray & Drift Management Plan

1999/2000
Season

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Australian Cotton Industry Council

A Guide to Developing a Spray & Drift Management Plan

1999/2000
Pearson



Notice

Please note that this document is intended to act as a guide only. The correct choice of chemical, and the rate and method of application (including compliance with the requirements of the label and other relevant legislation and regulations), are the responsibility of the user.

While every effort has been made to ensure the information contained in this document is correct, it cannot cover all situations. Users must obtain their own advice and conduct their own investigations and assessments for any plan they are developing, in light of their individual circumstances.

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Introduction

This document is designed to assist users to develop a spray and drift management plan for their own farming operation, and applies equally to aerial and ground applications. The development of a spray and drift management plan is based on two fundamental requirements:

1. Establishing good communication with everybody involved and interested in the application of pesticides. This communication is required both pre-season (i.e. in the planning phase) and during the season (i.e. the operational phase). It should exist between the farmer on whose property the pesticides are being applied, the applicator, the persons responsible for recommending and deciding whether an application is required, and neighbours.

2. The use of the correct application techniques.

The development of a spray and drift management plan helps to ensure that everyone with a role in relation to pesticide use and application has a clear understanding of their respective responsibilities. It also assists in identifying the risks associated with pesticide applications so that management strategies to minimise those risks can be established.

Supporting the communication strategy will be appropriate record keeping—of the spray and drift management plan itself, and how it was developed, as well as the details of the pesticide applications. This record keeping is essential for a number of reasons, including as a means of:

- systematically analysing your spraying operations;
- complying with various regulatory requirements, and;
- demonstrating due diligence.

Section A of this Guide focuses on pre-season planning and communication. It contains some of the issues to be considered before the season starts. Sections B to E cover a range of issues that must be considered with each spray application, but which should also be included in the pre-season planning stage. Some general requirements of the spray and drift management plan are then discussed in sections F and G. Finally the Guide also includes a template cover sheet to be used with the final spray and drift management plan that is distributed to the involved parties.

Please note that while the general requirements for managing spray applications are outlined here, the new endosulfan label (for the 1999/2000 season) has significant restrictions and requirements for users of that pesticide. These include restrictions on the number of sprays, the timing and method of application, and specific requirements regarding notification of neighbours, training, the development of a spray and drift management plan and record keeping. The general nature of these specific restrictions and requirements are noted throughout the Guide. However, users of endosulfan must read the label to ensure they are familiar with those specific requirements. Various supporting documents to help users understand the endosulfan label, and to comply with its requirements (e.g. record keeping and neighbour notification) have been developed by the National Registration Authority ("NRA"). Copies of these documents are included with this Guide, and are available from retailers of endosulfan and the NRA.

Similarly, the new parathion-methyl label, scheduled to be in force from 31 December 1999, also has a number of specific requirements. The general nature of these is also noted throughout the Guide. Users of parathion-methyl must read the label to ensure they are familiar with those specific requirements.

Developing a Spray and Drift Management Plan

This Guide is designed to lead the user through the issues that need to be considered in developing a spray and drift management plan. Each of the major sections addresses an issue which your spray and drift management plan should include i.e. your spray and drift management plan should detail the strategies and actions as to how those issues will actually be dealt with on your farm. A checklist is provided that should be used when listing the components of the farm specific spray and drift management plan.

It is suggested that you read the entire Guide before you begin developing the spray and drift management plan, so that the range of issues to be addressed, and how they relate to each other, can be seen. Listed at the end of the Guide are a number of documents that may assist you in developing the spray and drift management plan. These may be useful as this document has been designed to provide guidance only. Some of the issues discussed are complex, and not able to be fully explained within this document. References are made in these cases to documents that contain a more detailed explanation of the issue.

A. Pre-Season Planning and Communication

Good pre-season communication is the essential starting point for the development of an effective spray and drift management plan. Listed below is a broad strategy for pre-season communication. The spray and drift management plan should detail how each of these areas is to be dealt with.

Farm Map

A detailed and accurate farm map should be the starting point of any discussions (a mud map or its equivalent is not sufficient). This farm map should include the following details to a distance of 1500 metres:

- houses and farm buildings (on own farm and neighbouring properties);
- neighbouring properties and travelling stock routes, including any livestock and other relevant land uses;
- cropping areas that could be treated with pesticides;
- roads;
- water courses and water bodies;
- potential aircraft hazards (power lines, towers etc.), and;
- windsocks.

Some of the above details may only be able to be completed after discussions with neighbours¹, consultants and applicators. If possible, notification requirements and details should also be included on the farm map.

Each spray order should include a copy of the farm map that highlights the following:

- area to be treated, and;
- special requirements to ensure identified areas are not affected by pesticide drift or odour.

Other details that should be included on the spray order form are listed below.

Checklist:

Farm Map developed and provided to applicator(s) and consultant prior to season.

1. Neighbours is used in the broad sense (i.e. people in close proximity, or affected), as the definition of the people with whom communication needs to take place depends on individual circumstances. It is up to you to identify those people with whom you need to discuss your pesticide application plans.

Neighbours

Prior to the start of the season, neighbours should be contacted so that the following issues can be discussed, with a view to reaching agreement on how spray operations are to be conducted:

- identification of crop types and locations on both properties (including pastures and grazing intentions)
- pesticides to be used, and the method of application
- what method of notification (if any) the neighbour would like during the season
- under which particular weather conditions areas will or will not be treated, or which particular pesticides will or will not be used (including when and how a spray operation is discontinued if weather conditions change)
- endosulfan notification and buffer zone requirements
- protocol for spray delays.

Maintenance of an effective communication process is difficult and time consuming and requires commitment and flexibility on the part of all stakeholders. An effective means of communication with neighbours is essential; however, the appropriate level and type of communication will depend on the individual circumstances of the parties involved.

Checklist: Pre-season meeting held with neighbour(s). Details of meeting date and results noted. Specific procedures developed for each neighbour

In NSW the Pesticides Act requires written consent if pesticides are to be applied by air to an area within 150 metres of certain defined places (see BMP Manual, Application booklet, page AP-5, footnote 4). For Queensland, the National Civil Aviation Authority regulations apply; these require written consent from the occupier of a dwelling if the aircraft flies within 100 metres of the dwelling.

Consultant

Clear responsibilities for each step of the application-decision process need to be defined before the start of the season. The steps that require a clear understanding are as follows (these assume that a recommendation for a pesticide application has been made by the consultant):

- Who makes the final decision on whether the application is to be made?
- Who orders the application?
- Who is responsible for notifying neighbours?

Irrespective of who orders the application, they should ensure that the other person is made aware of the decision, and planned timing of the application. If the decision to spray and/or the responsibility to order the spray is the farmer's, the farmer needs to ensure that the consultant is aware of that decision, and of any delays that may occur. If the responsibility for ordering the spray lies with the consultant, the consultant must ensure the farmer or their representative is aware of the decision and spray order.

The consultant also needs to be aware of the details of neighbouring areas, so that these can be taken into account when making recommendations. Other potential issues for agreement include thresholds to be used and compliance with the Resistance Management Strategy. The number of endosulfan applications that can be made (dependent on the ability to capture tailwater) must also be noted. Cotton Consultants Australia has established a certification program for its members. Discussions with the consultant should include details of their involvement in the program.

Checklist: Pre-season meeting held with consultant. Clear responsibilities established, agreed and listed

Applicator

It is also essential that a pre-season meeting is held with the applicator of the pesticides (whether aerial or by ground, and if by ground, whether or not a contractor or employees will be carrying out the applications). This meeting should be a joint meeting with the consultant if possible, so that the three people directly involved have the opportunity for a full discussion.

The Aerial Agricultural Association of Australia has a certification program called Operation Spray Safe, which requires aircraft operators to employ approved pilots, ensure that their aircraft and equipment are of satisfactory standard and that they adhere to regulations relating to the environment, workplace health and safety, dangerous goods storage and transport and that they apply products according to label directions. Discussions with aerial applicators should include details on their involvement in, and adherence to, the Operation Spray Safe requirements.

Discussions with ground rig operators should include the level of training of the rig operator, including the specific training requirements of the endosulfan label.

Issues that need to be discussed, and procedures agreed to, include the following:

- Method of application for specific areas (i.e. ULV, Large Droplet Placement or groundrig)
- Ordering of pesticide applications (to be in writing—see below for details to be included)
- Whether confirmation of job completion required and, if so, details to be confirmed
- Procedure for a delayed application
- Responsibility for monitoring application (see below under weather conditions)
- Communication during application
- How decisions to pull out of a job are made (i.e. if conditions change).

Details to be included on spray order form

(Many of these details can be included on the farm map that should be provided with every order or may be detailed in the spray and drift management plan itself)

- Precise location of crop to be treated
- Crop and pest to be treated
- Chemical and rate
- Total volume to be used
- Location of sensitive areas, including neighbouring crops etc
- Contact person(s) and contact details
- Other hazards (e.g. power lines, houses, chipping crews)
- School bus run times
- Neighbour notification.
- Date
- Job and crop check references

Checklist: Pre-season meeting held with applicator. Clear responsibilities established, agreed and listed.

B. In-Season Communication

The pre-season meeting(s) will have resulted in agreed procedures for communication during the season. These procedures should cover the following areas:

- Notification requirements for neighbours, including farmer's and neighbours' contact numbers;
- Communication between farmer, consultant and applicator when ordering the application;
- Communication during and after the application
- Protocol for dealing with delayed applications.
- Protocol if farmer cannot be contacted
- Clearly defined complaint handling procedures

The National Registration Authority has produced a supplementary booklet as part of the endosulfan label that provides further details about the label requirements. These details include how to calculate the neighbour notification zone and how to notify neighbours. The NRA has also produced a standard "NRA Endosulfan Neighbour Notification Form". Copies of both these documents are included with this Guide. Copies are also available from endosulfan retailers and the NRA.

The endosulfan label has specific neighbour notification requirements, which are determined by the method of application and formulation used. Unless otherwise agreed in writing² with neighbours, notification to spray endosulfan must take place between 48 and 12 hours before spraying is intended. Neighbouring properties and residences are those with boundaries within:

- 1500 metres for ULV use;
- 750 metres for aerial EC, or;
- 200 metres for ground EC application

of the area of cotton to be sprayed.

Checklist: In-season communication requirements clearly defined

2. The endosulfan label states that "Notification may be done by a method agreed in writing with the neighbouring occupier or owner". This allows a cotton grower and a neighbour to make other arrangements for notification as long as both are satisfied with those arrangements and they are put in writing. Other arrangements include for example, that no notification at all is required, or that notification by telephone is sufficient.

C. Weather Conditions³

It is important to establish key parameters for weather on the farm that determine under what circumstances an application proceeds (or is discontinued). For example, Field X may note that "Ground rigs only to be used. Endosulfan not to be applied when the prevailing wind is from the Southeast. Profenofos not be used at any stage."

Spraying outside the parameters noted below increases the risk of drift, and should not be carried out unless a careful consideration of the increased risks has been made, and specific strategies are adopted to manage the increased risk.

Establishment of appropriate parameters

Prevailing weather conditions are one of the most important factors in determining pesticide drift. Each area to be treated with pesticides should include reference to the following factors:

- Any applicable restrictions on product use (including no use at all), with reference to:
 - (i) product type
 - (ii) particular wind directions and other relevant weather parameters
 - (iii) application method.

Wind speed and direction

For most spraying operations, wind speed should be between 4 and 20 kilometres per hour. Where possible, spraying should be carried out with a crosswind, with the operation working into the wind towards the unsprayed area.

Spraying should not take place if wind direction or strength is variable.

Temperature and humidity

Temperature affects evaporation rates, and is therefore a critical parameter for water based applications. Evaporation reduces droplet size, which increases the drift potential. Therefore water-based sprays should only be applied when Delta T (dry bulb temperature minus wet bulb temperature), a measure of evaporation potential, is less than 10° Celsius.

Atmospheric stability

Spraying should take place ideally when the atmosphere is stable, and there is not a temperature inversion. Spraying should be avoided in highly unstable conditions. Indications of unstable conditions include fast cumulus cloud build up and thunder storms. Diagrams depicting stability conditions and inversion layers can be found in the Spray Application Guidelines for Groundrig Operators.

Inversions

No applications should take place if a surface temperature inversion is present. Note that the endosulfan label states "Do not apply endosulfan when surface temperature inversion conditions exist at the application site". These occur when air closer to the ground cools faster than the air above it. This forms a layer of air increasing in temperature (instead of the normal decreasing). Small spray droplets released into an inversion layer can remain suspended in the air instead of being deposited into the crop, and can potentially drift long distances. Inversion conditions are most likely to occur in the absence of wind early in the morning and late in the afternoon. The presence of an inversion can be determined by using smoke—a thin layer of smoke or fog at a constant height indicates a surface temperature inversion.

Other critical factors to consider and record are the application method, formulation (including droplet size), speed of the application equipment, and height of release.

3. See SPRAYpak, NSW Agriculture's Principles of Spray Drift Management or the various QDPI publications for more details on weather conditions.

Weather Forecasting

Where possible, weather forecasts should be used to help decide whether or not a spray application should take place. Note that the endosulfan label states "DO NOT apply if heavy rains or storms that are likely to cause surface run-off are forecast within two days of application." A fax-back service is available from the Bureau of Meteorology on 1902 935 376 (northern NSW and southern Qld) or 1902 935 385 for central Qld. General information is also available on their website, www.bom.gov.au.

Checklist: Appropriate weather conditions established for all areas to be treated

Monitoring of weather conditions

Weather conditions should be monitored throughout both aerial and ground applications to ensure that the application is halted if the conditions become unsuitable. The farmer and applicator need to establish:

- How the weather is monitored (what equipment is used, who uses it)
- How the information is recorded (who does it?)
- Who is responsible for making the decision to stop if weather conditions change
- The procedure for informing the applicator.

The endosulfan label has specific requirements regarding weather monitoring. Refer to the supplementary label booklet and the Endosulfan Record Keeping Form for details.

Checklist: Responsibility and procedure for monitoring weather conditions established

D. Buffers

While it must always be remembered that buffers are not a primary means of drift management, buffers are an important component of drift management and are now required to comply with the endosulfan label. However, buffers should not be relied upon solely to manage drift. Wind direction and pesticide selection should always be considered first. It is critical to note that the endosulfan label buffer distances do not reduce your obligation to prevent drift onto neighbouring properties.

The endosulfan label requires that the following downwind buffer distances be used:

- | | |
|------------------------------|-------------|
| • ULV applications | 1500 metres |
| • EC Aerial applications | 750 metres |
| • EC Ground rig applications | 200 metres |

Endosulfan cannot be sprayed within these distances without the prior written consent of the occupiers of the downwind (at time of spraying) neighbouring property or residence. This written consent must contain certain information, which is detailed in the supplementary booklet of the endosulfan label. Further details on how to calculate the downwind buffer zone are also contained in this supplementary label booklet.

Discussions with neighbours, consultant and applicator should include the use of buffers. Their use needs to be assessed on a site by site basis taking into account the following factors:

- The nature of the sensitive area
- The pesticide being used
- The distance between the crop and the sensitive area
- The type of catching surface between the crop and the sensitive area (well grown, leafy crops are good catchers of droplets, while fallow fields, or seedling crops are poor catchers of droplets)
- The method of application being used, and the droplet size being generated
- The prevailing weather conditions.

Permanent buffers (e.g. purpose planted trees) have particular requirements, which are summarised in the BMP Manual Farm Design and Management booklet on page FD 10. See "Growing Trees on Cotton Farms" for detailed information.

E. Equipment Selection and Maintenance

Aerial Application

Pre-season discussions with the applicator should include application method options and how the aircraft has been set up to minimise drift. Note that the endosulfan record keeping requirements (which are the responsibility of the grower using the endosulfan to complete) include details of aircraft speed, boom length as a percentage of wingspan and nozzle angle.

Ground Applications

More detailed information for operating ground rigs is available in the publication "Spray Application Guidelines for Groundrig Operators." Note that the endosulfan label has specific requirements regarding the volume of water carrier, nozzle type and specification and the type of equipment being used. Consult the supplementary booklet of the endosulfan label for details regarding these requirements.

Careful consideration needs to be given to the suitability of the equipment for the job at hand. The equipment should be specifically designed for the application method being performed. Regular calibration and maintenance of ground rigs is essential and will help ensure that the equipment is operating as efficiently as possible. Equipment checks should include:

- Nozzle wear and performance
- Nozzle output, including calibration of ground speed
- Filters
- Delivery pressure (regulators and gauges)
- General wear, tear and damage, particularly checking for any leaks.

All operators should be appropriately trained in how to manage pesticides, and in how to calibrate, operate and maintain ground rigs. If ground rig contractors are used, they should be asked to show how these issues are addressed. All ground rig operators (contractors and employees) should be familiar with the farm's spray and drift management plan.

Boom height and nozzle selection and pressure

The height of spray release is one of the factors that determine drift potential, with the potential increasing as the height of spray release increases. Booms should be operated as low as possible as the nozzle and spray coverage requirements allow.

An increase in pressure causes most hydraulic nozzles to generate a finer droplet spectrum. Spray pressure should also be as low as possible as the nozzle and spray coverage requirements allow.

Nozzles can be classified according to their drift potential. Nozzles with a low drift potential should be selected.

Retailers of nozzles should have detailed information on nozzle performance.

Weather monitoring equipment

Weather monitoring equipment should also be included on the maintenance schedule.

Checklist: Equipment maintenance discussed and protocols established

F. Record Keeping

Good records provide valuable information that can be used to analyse pesticide use, and also provide a means of demonstrating that appropriate steps were taken to manage the pesticide application. Good records would also be of assistance in defending any allegations of inadequate management of applications. In any event, maintaining records of pesticide use is required under relevant Occupational Health & Safety legislation and for the use of endosulfan and parathion-methyl.

Clear responsibility for creating the records should also be established; where the records are kept should also be noted. It is important to note that detailed forms are not necessarily required—the farm diary can be used to record details of contacts with neighbours, and calibration and maintenance programs for example, while the spray recommendation/insect check sheet and spray order form will also contain a lot of the required information. The spray and drift management plan itself may also be used as a place for relevant notations.

Records should be kept of the following:

- Communications with stakeholders
- Notifications made – who, when and how, and responses received
- Application order
- Crop and pest to be treated, location and area
- Weather conditions at time of application
- Who applied the pesticide, and who monitored the application
- Application start and finish times
- Any relevant events that occurred during or after the application, and any corrective measures adopted as a result
- Training of applicators.

The endosulfan label requires that users of that product must keep "auditable" spray records. The details that are required to be recorded are listed in the standard Endosulfan Record Keeping Form produced by the NRA. A copy of this form is provided with this Guide. Further copies of this Form are available from endosulfan retailers or the NRA.

Similar record keeping requirements will be incorporated in the new parathion-methyl label, scheduled to come into force from 31 December 1999. The types of records required include pest monitoring, extent and timing of sprays, prevailing wind direction, wind velocity and block sprayed.

Checklist: Appropriate record generating procedures and responsibilities established

G. Other Issues to be Considered

Training

The endosulfan label requires that endosulfan can only be purchased by people who are Farmcare certified i.e. any one of the following:

- National Farmcare Chemical User Certificate
- Farm Chemical Users Certificate
- ChemCert Australia Farm Chemical User Certificate,

or in Queensland:

- Chemsart or Chemsafe Chemical User Certificate

OR who hold a chemical applicator's licence.

Chemical retailers are required to verify that each purchaser holds an acceptable accreditation, and record the certificate number and other details in a record for the NRA.

Anyone wanting to purchase, mix and/or apply endosulfan must have completed and received a certificate from an NRA approved course provider. This means that both the person purchasing the endosulfan AND the person mixing AND/OR applying it must have an appropriate certificate.

Similar training requirements will be incorporated in the new parathion-methyl label, scheduled to come into force from 31 December 1999. It recommends that a person using, keeping or disposing of this product should have successfully completed an appropriate course of training such as the Farm Chemicals Users Course or similar qualifications.

Water Management

The responsibilities regarding water management include, in New South Wales, not to pollute waters (Clean Waters Act) and to recirculate tailwater as a condition of surface water irrigation licences. In Queensland, the

Environmental Code of Practice for Agriculture notes that "All reasonable and practicable measures should be adopted, within the constraints of a sustainable agricultural system, to conserve the character and quality of waterways and water". The Farm Design and Management booklet of the Best Management Practices Manual contains information on developing a storm water management plan to help address these responsibilities.

The new endosulfan label states that endosulfan use is limited to a total of 2205 grams of active ingredient per hectare per growth season (equivalent to 3 full coverage applications of 735 grams active ingredient per hectare) where irrigation tailwater and up to 25 millimetres of rainfall can be captured on farm.

If tailwater and up to 25 millimetres of rainfall cannot be captured on farm, the total limit of endosulfan is reduced to 1470 grams of active ingredient (equivalent to 2 full coverage applications) per hectare per growth season.

The endosulfan label also states "DO NOT apply when irrigating or for at least two days after irrigation, or to waterlogged soil or while water remains in furrows unless tailwater can be captured" and "DO NOT apply if heavy rains or storms that are likely to cause surface run-off are forecast within two days of application".

Endosulfan Use Window and Crop Height Restrictions

The endosulfan label includes the following restrictions regarding the height of the crop and the window of application:

Aerial application is restricted to cotton crops over:

- 30 centimetres in height for ULV applications
- 20 centimetres in height for EC applications

Endosulfan can only be applied by air during specified time windows (except for the shires listed below, whose windows are shifted two weeks earlier):

- 1 December to 15 January for ULV applications
- 15 November to 15 January for EC applications

For the Shire Council areas of Bourke and Walgett in New South Wales, and Balonne, Banana, Bauhinia, Belyando, Broadsound, Dalrymple, Duaringa, Emerald, Peak Downs, Richmond and Waroo in Queensland, the time windows are:

- 15 November to 31 December for ULV applications
- 1 November to 31 December for EC applications

In the Spray and Drift Management Plan

The spray and drift management plan should also contain the following information:

- Farmer contact details, generally, and during an application
- Dates of relevant meetings, and when the plan was last reviewed
- Who has been sent/provided with copies of the spray and drift management plan (all neighbours, consultant and applicator, for example)?

Generally

All users of a pesticide must read the label before applying the pesticide. They should also have a good understanding of spray application technology. The basic competencies required to use pesticides are covered in the Farmcare Farm Chemical Users course.

Appendix

The following table may be used as a starting point when establishing the responsibilities the respective parties have in the application of pesticides. The spray and drift management plan should assign clear responsibility for each of these areas.

Grower	Responsibilities Consultant	Applicator
<ul style="list-style-type: none"> • Familiarity with the techniques and technology available to reduce pesticide use 	<ul style="list-style-type: none"> • Sound knowledge of techniques and technology available to reduce pesticide use 	<ul style="list-style-type: none"> • Licence or certification to demonstrate training and competence
<ul style="list-style-type: none"> • Identification of environmental risks and hazards 	<ul style="list-style-type: none"> • Clear working knowledge of client's pesticide management policies and spray and drift management plan 	<ul style="list-style-type: none"> • Equipment that is well set up, and maintained and calibrated appropriately
<ul style="list-style-type: none"> • Development of pesticide management policies (spray and drift management plan), especially with respect to drift and odour 	<ul style="list-style-type: none"> • Recommendations on pesticide use that: <ul style="list-style-type: none"> (i) Are in writing (ii) Accord with label directions (iii) Support industry strategies (iv) Are consistent with client's spray and drift management plan (v) Include alternatives if required 	<ul style="list-style-type: none"> • Clear working knowledge of client's identified sensitive areas and their pesticide management policies and spray and drift management plan
<ul style="list-style-type: none"> • Communicate policies/spray and drift management plan to all associated and affected parties: <ul style="list-style-type: none"> • Spray applicators (contractors and staff) • Consultant • Staff • Chippers • Neighbours 		<ul style="list-style-type: none"> • Written confirmation of the spray order • notification of delays • confirmation of job completion
<ul style="list-style-type: none"> • Written spray orders, which include a copy of the farm map and area to be treated 		<ul style="list-style-type: none"> • Ultimate power/responsibility to decide on appropriateness of weather conditions UNLESS asked to pull out by farmer.
<ul style="list-style-type: none"> • Monitoring of weather conditions during application 		
<ul style="list-style-type: none"> • Employees engaged in mixing, loading or applying pesticides have received appropriate training 		

References and Further Information

(Note that most of these documents were developed prior to the new endosulfan label. The specific requirements of the label take precedence. It includes the following statement "When used on cotton (it) must be used in accordance with the current Australian Cotton Industry Best Management Practices Manual and its associated spray and drift management plan except when advice or requirements from cotton's best management practices conflict with conditions of use found on this label or in the booklet (attached to container) which forms part of this label. In such cases, label directions must be followed".)

Australian Cotton Industry Best Management Practices Manual (December 1997)

SPRAYpak, The Cotton Growers Spray Application Handbook (December 1994)

Banks A, Broadley R, Collinge M and Middleton K (1993) Pesticide Application Manual (2nd edition)
Queensland Department of Primary Industries, Information Series QI89003

Broadley R, Priestly K and Collinge M (1986) Pesticide Drift: description, causes and remedies
Queensland Department of Primary Industries, Information Series QI86001

Hughes P, Rickman J and Marshall J (Ed's) (1994) Pesticide Application Guidelines Proceedings of the Spray Application Workshops 1994, Queensland Department of Primary Industries

New South Wales Agriculture (October 1998) Principles of Spray Drift Management

Emerald Cotton Growers Association & Cotton Australia (August 1997) Emerald Cotton Industry Aerial Spray Management Plan

Gunnedah Chemical Liaison Committee (3rd edition, 1998) Guidelines for the Application of Agricultural Chemicals: Gunnedah Shire and Surrounding District

Gwydir Valley Cotton Growers Association and Australian Cotton Foundation (1993) Gwydir Valley Cotton Industry Aerial Spray Guidelines

Lower Namoi Cotton Growers Association (November 1998) Lower Namoi Guidelines for Application of Agricultural Chemicals

Mensah, R and Wilson L (August 1999) Integrated Pest Management Guidelines for Australian Cotton (Available as an ENTopak insert)

Queensland Farmers' Federation, The Environmental Code of Practice for Agriculture

Rankine I and Hughes P (In Press) Spray Application Guidelines for Groundrig Operators Cotton Research & Development Corporation

South Queensland Cotton Growers Association and Queensland Grain Growers Association (1995) Darling Downs Aerial Spray Guidelines

Voller, P (Editor) (1999) Growing trees on cotton farms — a guide to assist cotton farmers to decide how, when, where and why to plant trees Rural Industries Research & Development Corporation, Publication No. 99/65 (1999)

Bureau of Meteorology website:

<http://www.bom.gov.au>

National Registration Authority website (for copies of the various standard forms):

<http://www.affa.gov.au/nra/welcome.html>

Spray & Drift Management Plan

for

(Farm Name)

(Farmer)

(Date Developed)

BMP Number: _____

Spray and Drift Management Plan Checklist

Farm Map (p4)

Date developed: _____

Next review planned for: _____

Pre-season Communication

• Neighbours (p5)

Date: _____

• Consultant (p5)

Date: _____

• Applicator/s (p6)

Date: _____

In-season Communication

• Consultant (p7)

Date: _____

• Applicator/s (p7)

Date: _____

Weather

• Appropriate conditions established for all areas to be treated (pp8-9)

Date: _____

• Responsibility and procedure for monitoring conditions established (p9)

Date: _____

The person responsible for monitoring weather conditions is: _____

Equipment maintenance protocols established (p10)

Date: _____

Record keeping procedures and responsibilities established (p11)

Date: _____