Agrichemical Trespass Ministerial Advisory Committee (ATMAC)

Final report to the Minister for the Environment

Published in November 2002 by the
Ministry for the Environment
PO Box 10-362, Wellington, New Zealand

ISBN: 0-478-24060-0
ME number: 432

This document is available on the Ministry for the Environment's website:
www.mfe.govt.nz

Acknowledgements

The Agrichemical Trespass Ministerial Advisory Committee would like to acknowledge the kind assistance of Donald Turley LLB, David Willetts of Harrison Grierson, Dr Ricky Gorringe, Kevin Currie and colleagues of the ERMA, Dick Burgess of the Ministry for the Environment, Debbie Morris of the ACVM unit at the Ministry of Agriculture and Forestry, John Marshall of Crop and Food, Graham Butler, Bob Boyd and Sally Gilbert of the Ministry of Health, Jane Lorimer of the National Beekeepers Association of New Zealand, James Gerrie of National Mutual, Murray Becroft and Ken Robertson of VegFed, Jeff Fowles and Sabrina Mazzoni at ESR, Wayne Temple at the National Poisons Centre, Helen Codlin of Hawke's Bay Regional Council, and all those who contributed to this report. The committee gratefully records the capable assistance of Ellen Blake and support from the Ministry for the Environment.

Newspaper articles on front cover supplied courtesy of:

- Bay of Plenty Times
- Shore News
- Hauraki Herald
- Gisborne Herald.

Contents

List of Tables

List of Diagrams

Executive Summary

The Agrichemical Trespass Ministerial Advisory Committee was set up to identify the nature and extent of problems arising from off-target exposure to agrichemicals and report to the Minister for the Environment on practical and workable solutions. This is their final report.

Agrichemical trespass occurs when agrichemicals travel off-target during application or use and cause an effect on others. The committee considers that the key objective of agrichemical applications should be to deposit the substance only on the target area, thus eliminating agrichemical trespass. This principle recognises that applying agrichemicals is a legitimate activity but one that should only affect the intended area. Therefore, this report emphasises the prevention of trespass occurring, while also examining the mechanisms to address trespass once it has occurred.

The committee considered the concerns and recommended solutions in four general areas set out below. The committee believes that once the recommendations have been implemented, that overall, the current situation will be improved.

Data, reporting and monitoring

The data available in the area of agrichemical trespass is variable and of poor quality. This is partly because incidents, for many reasons, are not reported. Poor monitoring of agrichemical use and the health and environmental effects of agrichemicals means that trespass issues can not be placed in a national context. This has meant the committee has focused on those areas where better data is available, largely the airborne travel of agrichemicals – spray drift – while recognising that ground and water transport of agrichemicals needs attention.

Good information is essential to target a response. The committee has recommended numerous practical solutions to address the data deficiency. These include better national monitoring of agrichemical use and effects, coordination of incident reporting and standardisation of the data.

Policy and enforcement

There are few civil cases or enforcement actions taken for agrichemical trespass considering the number of reported incidents. The reasons for this are varied and include: a perception that even if reported nothing will happen; the difficulty of proving a health or environmental effect; and, the difficulty of establishing the level of proof in both civil and criminal proceedings. Obtaining appropriate compensation once a case has been established is also an issue.

Careful consideration of the adequacy of existing legal mechanisms has led the committee to conclude that until the Hazardous Substances and New Organisms (HSNO) legislation comes into full effect after the transitional period, it can not be properly assessed. However, the committee is concerned about the practical application of the environmental exposure limits, and considers that urgent attention should be given to determine how these will work in the field.

Amendments will be required to provide the mandate for regional councils and the National Poisons Centre (the two agencies receiving most calls on agrichemical incidents) to be part of a co-ordinated incident reporting system under the HSNO Act.

Information, education and best practice

There is a range of information, educational opportunities and best practice methods available to users but the use of these is varied across sectors. The committee considers that all agrichemical users should have some education and training. This would vary from an elementary level for domestic users to advanced training for all contractors who apply agrichemicals as their business.

Information and best practices should be developed in those areas where they are lacking and should be widely available to agrichemical users. Existing documents such as the NZS 8409: 1999 *Code of Practice for the Management of Agrichemicals,* and guides to growing and maintaining live shelter belts should be developed and widely disseminated.

Research and development

The committee identified several areas for research and development. Work is occurring in some of these areas while others are new. It is recognised that some research work will take time and may rely on overseas initiatives. The most urgent need is to determine how to achieve practical compliance with the environmental exposure limit under the HSNO legislation.

Implementation

In making its recommendations the committee has taken an approach that generally aims to enhance coordination and co-operation, and elevate awareness within and between agencies, stakeholders and the community.

The committee expects the findings and recommendations to be reviewed as the data improves and the HSNO legislation takes effect. This would enable other targeted responses to be developed.

While some recommendations will be more easily implemented than others, it is important to see the recommendations as a whole package. All need to be implemented over time to address the issues. An implementation group is seen as valuable in this regard, and the committee has attempted to prioritise recommendations to assist this process.

1 Introduction

This is the final report of the Agrichemical Trespass Ministerial Advisory Committee (ATMAC) to the Minister for the Environment. The committee, appointed in May 2001, comprises Bob Priest (Chair), Helen Atkins, Alan Cliffe, Francesca Kelly, Richard Kempthorne, John Maber, Graham McBride, Audrey Severinsen, Percy Tipene and Meriel Watts (*see* Appendix 1 for more details). This report covers the approach, and presents the findings and recommendations of the committee, as required in the terms of reference (Appendix 2).

The Agrichemical Trespass Ministerial Advisory Committee (ATMAC) task

The ATMAC was set up, as per the terms of reference, to identify the nature and extent of problems arising from off-target exposure to agrichemicals, and reach a consensus and report to the Minister on practical and workable solutions.

The Committee was not expected to undertake extensive public consultation or become involved in detailed research. Rather it was expected the committee would use its extensive experience and skills and professional networks to gather information and assess issues and concerns.

"Agrichemical" is defined in the terms of reference to mean any substance manufactured for the purpose of causing mortality, inhibited growth, or inhibited reproduction in an organism (the definition of "biocidal action" under the Hazardous Substances and New Organisms Act 1996). This covers all substances commonly thought of as "pesticides" (e.g. herbicides, insecticides, fungicides, etc.) but excludes fertilisers. It is important to note that all chemical applications can cause trespass problems. However for the purposes of the committee's work we confined our investigations to "agrichemical" as defined above. The definition of pesticide in the Pesticide Risk Reduction work (*see* below) is equivalent to the definition of agrichemical.

What is agrichemical trespass?

This report is concerned with agrichemical trespass, a particular subset of the issues facing agrichemical users and the community. "Trespass" in this context has the ordinary everyday meaning:

> *trespass –1.* n *A transgression, an offence; a sin; a fault.* arch. *exc. as in sense 2.* Law *Formerly, an unlawful act;* esp. *any such act other than treason, felony, or misprision of either. Now* spec. *an unlawful act deliberately committed against the person or property of another,* esp. *wrongful entry on a person's land or property. 3.* fig. *An encroachment, an intrusion*
>
> New Shorter Oxford English Dictionary 1993

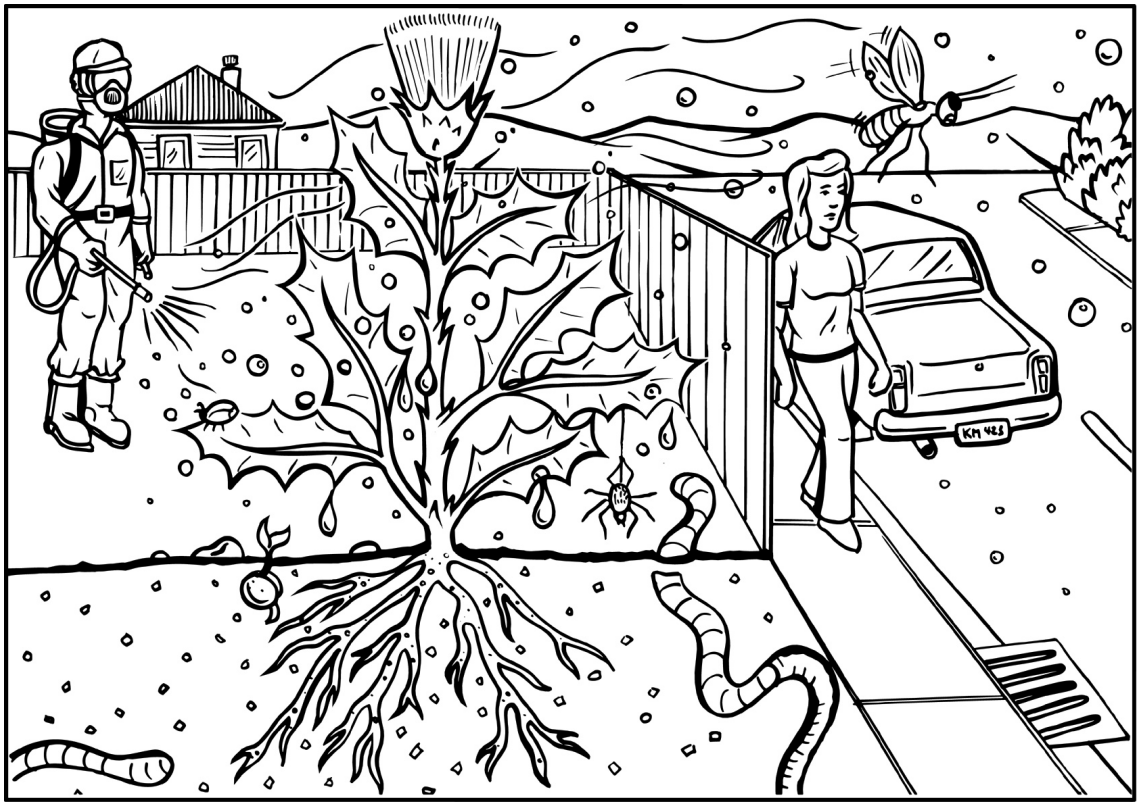
In the context of this report agrichemical trespass occurs when the actions or omissions of one party cause an adverse effect on the property or person of another. The trespass will occur no matter how small the effect, although the scale of the effect will impact on any penalties imposed. The meaning of trespass encompasses the common law actions of nuisance and negligence. Various pieces of legislation also control actions that might lead to trespass, e.g. the discharge of contaminants to the environment under the Resource Management Act (RMA).

Trespass can also include lack of choice regardless of actual effects. In the 1994 report on possums, the Parliamentary Commissioner for the Environment puts it like this:

> *However, this does not address the issue of choice. If a person does not want certain chemicals in their environment or water supply, regardless of the real, perceived, or proven impacts this may have on their physical health, they may well argue against imposition of those chemicals. Their inability to say no may affect their mental health, their organic certification and economic health if they are an organic grower, or their spiritual health and ability to exercise kaitiakitanga (guardianship) if they are tangata whenua* (Parliamentary Commissioner for the Environment, 1994, page 58).

The use of agrichemicals is a valid and legal means to control "pests". In any application or use the agrichemical may travel to one of three areas – the pest target, the non-target area within the application zone, and an off-target area away from the application zone. The committee in looking at agrichemical trespass is only concerned with the off-target agrichemical.

Diagram 1: On-target, non-target, and off-target travel of agrichemicals



The off-target travel of an agrichemical (over the fence in the illustration) can occur through the air, through the ground and soil, and by water. Agrichemical trespass can occur when an agrichemical travels off-target by any of these means. In reviewing the available information the committee found that most information on trespass-type situations relates to off-target agrichemical travel by air, e.g. sprays, vapour, accidental discharge from an aeroplane. No New Zealand information was found about off-target movement of agrichemicals on soil particles. There is a small amount of information on trespass-type situations for surface and ground waters where it is usually very difficult to identify specific events leading to the trespass. The committee has therefore focused its attention on airborne trespass issues but acknowledges that further work needs to occur for both soil and water. The committee has also focused its attention on current trespass events and not historical contamination issues.

Spillages and road accidents can also create a trespass situation but these do not occur during the "use of the agrichemical" and are usually adequately covered by legislation, including the RMA. Exposure of workers to agrichemicals used at their workplace is not usually a trespass situation, nor is exposure of people (or animals) to agrichemical residues in food. This report is focused on those situations where agrichemicals travel off-target during application and use, largely from recent airborne events.

Pesticide risk reduction strategy

A pesticide risk reduction strategy is being developed that will propose options for government consideration aimed at reducing "on-target", "non-target", and "off-target" pesticide risks. A public discussion paper – Towards a Pesticide Risk Reduction Strategy for New Zealand – is due to be released in early 2002, and does not draw a sharp distinction between on and off-target risks. Public submission on the discussion paper is expected on both aspects. For this reason work on the Pesticide Risk Reduction Strategy and the ATMAC will overlap. Additionally, many of the recommendations to reduce off-target risks, for instance, promoting best practice in agrichemical application, will also reduce on-target risks. Some of the recommendations of this report could form part of the Pesticide Risk Reduction Strategy.

The Agrichemical Trespass Ministerial Advisory Committee (ATMAC) approach

The ATMAC has held eight meetings over nine months. Following the terms of reference the committee has attempted to identify the nature and extent of problems associated with agrichemical trespass and their solutions. A consensual approach to develop an understanding of the issues and solutions has been taken. Information has been gathered using committee members' own networks and through contact with some key organisations and individuals. While a range of individuals and organisations were contacted and made comments to the committee, the observations and conclusions of this report are those of the committee.

The issues surrounding agrichemical trespass are complicated and have previously received a lot of attention; that is, they are not new (*see* Appendix 3 for a summary of some previous work). The issues impinge on much broader policy areas including pesticide use, the assessment of health and environmental effects, monitoring systems, market compliance, and avenues of legal redress. Any actions need to consider the wider context to achieve sustainable solutions.

The committee reviewed issues and solutions using four broad areas:

- data, reporting and monitoring
- policy and enforcement
- information, education and best practice
- research and development.

In doing this, the committee's view is that issues that need to be addressed are both complex in nature and highly interconnected. Accordingly the committee considers that any set of solutions need to be similarly interconnected and sufficiently broad in scope to address the full extent of concerns.

The committee has taken an approach that generally aims to enhance coordination and co-operation, and elevate awareness within and between agencies, stakeholders and the community.

The committee considers that the aim of agrichemical applications should be to deposit the substance only on the target area with no agrichemical trespass. The committee recognises that applying agrichemicals is a legitimate activity but that it should only affect the intended area. Therefore, this report emphasises the prevention of trespass occurring. However, the report also examines the mechanisms to address trespass once it has occurred.

2 Concerns and Issues

A range of sources have been used to gather information on agrichemical trespass concerns and issues, including published material, surveys of regional councils and district plans, and ATMAC members' own extensive experiences and networks. The committee has been constrained in its deliberations by the quality of the data available and the difficulty in interpreting it.

There is a wide range of concerns and issues, including:

- the lack of data and reporting
- the poor quality of the available data
- health effects from agrichemical trespass
- environmental and property effects
- difficulties in taking civil cases and enforcement actions
- the adequacy of existing law
- the adequacy and patchy application of best practices.

The concerns and issues are outlined under the following headings:

(1) Agrichemical trespass incident data
   a Data available
   b Types of agrichemicals involved
   c Application methods
   d Applicator issues

(2) Effects of agrichemical trespass
   a Health effects
   b Property effects
   c Other environmental effects
   d Other effects

Agrichemical trespass incident data

A range of agencies are involved in gathering data related to agrichemical trespass incidents. However, apart from one agency (Ministry of Health), the data gathered is not specifically aimed to inform about agrichemical trespass. As the agencies collect data for their own purposes, the feasibility of extracting details on agrichemical trespass from the data is highly variable. The data generally refers to reported incidents and not to proven cases of trespass. In many instances there is no information on the agrichemical involved (or even if an agrichemical was involved) and even where a product is named this may not be accurate. Hence, there is a lack of depth and an element of inaccuracy in the data. The information available from the various agencies is outlined below.

a Data available

Ministry of Health data

The Ministry of Health investigates and records spray drift incidents (a subset of agrichemical trespass) where a health effect is shown. The Ministry's system includes a guideline, *The Investigation and Surveillance of Agrichemical Spraydrift Incidents*, and a computerised recording system called DriftNet. The system relies on the regional public health services recording incidents they become involved in. This information is then collated nationally by ESR and an annual report produced. The impetus for this system came from the Parliamentary Commissioner for the Environment's 1993 report on spray drift. DriftNet reports are available for 1998, 1999 and 2000.

Table 1: Summary of DriftNet reported incidents 1998–2000

Part 1998	13
January–December 1999	16 (3 investigated as per protocol)
January–December 2000	13 (11 followed up and 1 investigated as per protocol)

Source: ESR reports to Ministry of Health 1999, 2000, 2001.

For the years 1999 and 2000, 17 of the 29 incidents recorded the chemicals as "2,4-D, 2-Butylamine, Chlorpyriphos, Dithiocarbamate, Fenoxapropethyl (Puma S®), Glyphosate (Roundup®), Paraquat, Phorate (Thimet®), Pyrethum" (*sic*). In the other 12 incidents, the chemicals were unknown (Fowles et al, 2001, page 27). For 1999 and 2000, 18 of the 29 incidents recorded involved spray drift over a residential property, and "vehicle mounted" spraying was involved in 12 of the 29 incidents.

Fowles et al (ibid) compared DriftNet data to Northland Regional Council and National Poisons Centre data for the same period. This found that while the data sets were not directly comparable, the DriftNet system was not capturing all the incidents involving human health effects. This possible under-reporting on the DriftNet system is confirmed by the committee's work, although the reason for it is unclear.

The Health Act requires certain "diseases" to be notified to health authorities, and ESR collates these notifications. The "diseases" include "poisoning arising from chemical contamination of the environment" (Second Schedule, Health Act 1956). ESR has received 15 notifications in this category over the last five years, one of which may have been due to spray drift. The committee believes this significantly under-reports the number of poisonings from agrichemical trespass.

Regional Council data

The regional council incidents recorded are from call/complaints databases that each individual council keeps. The incidents are recorded in slightly different ways and are not intended to specifically address agrichemical trespass complaints.

The available data shows significant numbers of incidents reported but the quality is highly variable and covers a range of effects.

The Ministry for the Environment has undertaken three surveys of regional councils on reported agrichemical trespass incidents (1997, 1998 and 1999 to 2001). The first two specifically asked for information on spray drift while the latest survey asked for information covering the wider area of agrichemical trespass. The following three tables present the summary findings from these surveys.

Table 2: Survey of agrichemical trespass complaints received by regional councils (1999–2001)

	1999 (April–December)	2000 (January–December)	2001 (January–February/June)	Total
Auckland Regional Council	10	23	10	**43**
Environment Bay of Plenty	41 (average)	41 (average)	41 (average)	**123**
Environment Canterbury	15	30	12	**57**
Hawke's Bay Regional Council	39	39	15	**93**
Horizons Manawatu-Wanganui		16	8	**24**
Northland Regional Council	71	40	3	**114**
Otago Regional Council	5.6 (average)	5.6 (average)	5.6 (average)	**16.8***
Southland Regional Council	2	4	3	**9**
Taranaki Regional Council	3	5		**8**
Environment Waikato	58	73	33	**164**
Wellington Regional Council	4	3	2	**9**
West Coast Regional Council		10	5	**15**
Gisborne District Council	9	8		**17**
Marlborough District Council	8	8	1	**17**
Tasman District Council	4 (average)	4 (average)	4 (average)	**12**
	269.6	**309.6**	**142.6**	**721.8**

Source: Ministry for the Environment, 2001.

* Otago have had 28 complaints since 1996.

Table 3: Survey of spray drift complaints received by regional councils (1 April 1998–1 April 1999)

	1 April 1998–1 April 1999
Auckland Regional Council	~20 enquiries
Environment Bay of Plenty	72
Environment Canterbury	3
Hawke's Bay Regional Council	
Horizons Manawatu-Wanganui	
Northland Regional Council	77
Otago Regional Council	
Southland Regional Council	
Taranaki Regional Council	1
Environment Waikato	53
Wellington Regional Council	9
West Coast Regional Council	
Gisborne District Council	
Marlborough District Council	6
Tasman District Council	
Total	**241**

Source: Ministry for the Environment, 1999.

Table 4: Survey of spray drift complaints received by regional councils (January 1997–October/December 1997)

	1997 (part)
Auckland Regional Council	~25
Environment Bay of Plenty	17
Environment Canterbury	2
Hawke's Bay Regional Council	28
Horizons Manawatu-Wanganui	6
Northland Regional Council	62
Otago Regional Council	8
Southland Regional Council	
Taranaki Regional Council	4
Environment Waikato	34
Wellington Regional Council	6
West Coast Regional Council	
Gisborne District Council	
Marlborough District Council	
Tasman District Council	11
Total	**203**

Source: Ministry for the Environment, 1997–98.

Northland Region consistently has higher numbers of complaints, though this is a region where agrichemical trespass has a high public profile. The Bay of Plenty, Hawke's Bay and Waikato also have high reported complaints. These areas may have higher intensive agrichemical uses such as in horticulture and orcharding, but this high complaints pattern does not occur in similar areas such as Tasman. The quality of the data is not sufficient to identify patterns or draw conclusions.

Vegetable and Potato Growers Federation (VegFed) data

This growers' organisation employs an investigator in the Auckland region (Taupo north) to investigate incidents including agrichemical trespass. He maintains a record of these reported incidents. VegFed do not have national data.

Table 5: VegFed spray drift incident reports 1998–2001

Year	1998	1999	2000	2001 to April	Total
Number	8	14	11	5	**38**

Source: Murray Becroft, VegFed incident reports.

Recorded by month, this data shows some grouping, which may be a seasonal effect. The incidents involve a range of crops, of which some crops and varieties are more susceptible to damage. The most commonly reported crop is tomatoes. The causal agent is often difficult to identify but damage in over half of the reports is typical of phenoxy herbicides such as 2,4-D. An estimate of the cost of damage is sometimes made at the time the crops are inspected. In eight cases where this was done the damage totalled over $454,340 in a three-year period (ranging from $5200 to over $100,000). More detail on the incidents reported to VegFed is in Appendix 5.

Other anecdotal information from VegFed indicates that their members often don't bother to tell them of damage because the remedies available are too difficult to obtain due to the burden of proof required.

The key crop affected were greenhouse tomatoes that are particularly sensitive to phenoxy herbicides used to control pasture weeds. Some greenhouse operations are very large, greater than 5 hectares under glass. Greenhouses close to dairy operations seem to have particular difficulties, but there are also problems with roadside spraying and unqualified spray contractors. Better communication between land users was seen as a key solution (pers. comm. K Robertson).

Pesticides: Issues and Options (Ministry for the Environment, 1989)

This report details a study of Pesticide Board files from 1973–1988 during which 568 recorded cases of plant damage occurred from spray drift. The full range of crops were affected, and aerial spraying caused 39 percent of the damage. The Agricultural Compounds and Veterinary Medicines Unit has set up an incident reporting system (similar to the Pesticides Board) but have not received any reports of agrichemical trespass.

National Poisons Centre data

The National Poisons Centre's primary purpose is to provide information about the full range of "poisons", from plants to cleaners, to medicines and agrichemicals. They do not assess the health status of individuals.

The National Poisons Centre in Dunedin receive about 20,000 calls a year, concerned with the health effects of exposure to the full range of chemicals and poisons [Until recently, when the Centre acquired an 0800 number, these calls were made at the full calling rate.] Of calls during 1999 and 2000, 3,601 involved agricultural products (18 percent), and a smaller number involved agrichemical sprays, as shown in Table 6.

Table 6: National Poison Centre Calls involving agrichemical sprays 1999–2000

Year	1999	2000
Total	244	225

Source: National Poisons Centre 2001 – list of agricultural chemical spray drift inquiries involving possible/probable human exposure.

The rate of calls about agrichemical sprays appears to be more prevalent in the summer months. Calls on agrichemical sprays account for about 1 percent of the total.

People call the National Poisons Centre to get advice on immediate concerns about personal health and there is no follow-up of cases. For example, one instance was of a 15-year-old male who ate blackberries that he, presumably, subsequently found out had been sprayed with Grazon®. He wasn't experiencing any health symptoms and was reassured. Another call concerned a 60-year-old man who was seen in hospital having been exposed to the organophosphate Phosrin® 4000. He was vomiting, sweaty, dizzy and had a slow heart rate. The National Poisons Centre was able to advise on treatment and monitoring. This amount of detail is the extent of the information recorded, in neither of these cases is it clear if the exposure was related to a trespass incident.

The National Poisons Centre also receives calls about poisoning of pets, the rate of which is increasing, although there is no data on numbers (Smith and Temple, 1998). Most of these calls involve agrichemicals (excluding animal remedies) and most calls come from veterinarians. The treatment of animals is quite different to that for people as their anatomy and physiology vary considerably.

The National Poisons Centre compiles a lot of information on agrichemical exposures but this is not well integrated with other databases.

BIO-GRO® data

This is the agency that licenses most organic growers, of which there about 700 licensed nationally. BIO-GRO® does not keep data on agrichemical trespass incidents but is aware of this as an issue. The agency's approach is to try to work through problems rather than de-register organic farms. There may be up to 20 percent of growers at any one time in the situation where they have a buffer zone of crops that cannot be sold as organic because of chemical exposure (pers. comm. S Mason).

Occupational Safety and Health, Department of Labour

OSH has a Notifiable Occupational Diseases System (NODS) that records the number of instances of certain occupational diseases. This is a voluntary system and the committee is not aware of any instances of disease involving agrichemical trespass.

District Council data

No information has been collected from district councils, apart from unitary authorities and the Auckland territorial authorities who undertake agrichemical trespass work for the Auckland Regional Council. It is likely that additional agrichemical trespass incidents have been reported to other district councils.

Accident Compensation Corporation (ACC) data

There are no known cases of ACC compensation for agrichemical trespass. ACC's available data is too general to determine specific causes of injury but some of the general injury categories may be relevant. For example, in the first three quarters of 2000/01 two cases were recorded in the toxic/adverse effect injury category, and 129 cases in the ongoing category.

Committee members are aware of anecdotal concerns about the ability of people suffering personal injury from agrichemical exposures to be compensated under the ACC system. While there is an element of lack of recognition of agrichemical exposure, there is also a perception of gate keeping by ACC. The committee has insufficient information to draw any conclusions.

Insurance

Insurance is a common method for dealing with liability from business risks. Insurance companies offer cover to deal with agrichemical trespass liability as part of the public liability provisions.

For example, Farmers Mutual Insurance Company paid out $224,000 for 21 claims over the last four years for spray damage to neighbouring properties (J Gerrie, Farmers Mutual Group, 2001 and in Appendix 5).

The Agricultural Aviation Association requires their members to have chemical liability insurance as part of their accreditation scheme.

The committee is not aware of the extent that insurance claims are used to compensate for agrichemical trespass damage.

Complainants

It appears there may also be under-reporting of incidents by complainants. The reasons are as diverse as complainants not knowing who to report incidents to or believing there is little point in reporting them, to gate-keeping that occurs when reported effects are not believed to be associated with agrichemicals or are not investigated.

Some complaints are related to the lack of notification about agrichemical applications and therefore the complainant's lack of knowledge of what is happening.

b Types of agrichemicals involved

It is difficult to determine the exact range of agrichemicals involved in trespass incidents or to determine if one agrichemical type is more implicated than others. Often the causal agent is not known. This is because of the nature of reporting the trespass and the quality of the data collected, as well as in many cases the difficulty of determining a causal agent.

The data gathered for this report does not show particular agrichemicals as the "culprits", rather a wide range of agrichemicals is reported and in many incidents no causal agrichemical is identified.

However, some agrichemicals do appear more often, these are:

- Phenoxy herbicides (hormone sprays) specifically:
  - 2,4-D as the ester and amine (data from VegFed, insurance, regional council, National Poisons Centre, DriftNet). Northland Regional Council identified 412 incidents relating to 2,4-D since 1995 to mid 2000 (NRC fax 1/5/00).
  - MCPA
  - Tordon®
- Glyphosate (there are over 60 registered products)
- Escort®
- Hicane®.

These are mainly herbicides, which because they cause noticeable crop damage, are probably more likely to be reported.

The frequency of an agrichemical causing trespass needs to be related to its level of use. Some agrichemicals are widely used by a range of users (e.g. glyphosate), some are used by only a few users but used widely nationally (e.g. 1080). The 1999 Review of Trends in Agricultural Pesticide Use (Holland and Rahman, 1999) gives some information on changing rates of use in the agricultural sector but the data collected is insufficient to determine the relationship of use to agrichemical trespass. The rate of problems compared with the rate of use is important information in determining appropriate solutions.

The amount of information on agrichemicals available at the point of sale can vary significantly. Many types of agrichemical for domestic and garden use are available from supermarkets and large chain stores. Little or no off-label information on application methods is available at these places. To avoid agrichemical trespass the committee believes that good information should be available at point of sale.

c Application methods

All types of application methods can cause trespass problems, but some methods are inherently more risky than others, such as aerial and air blast spraying. The two key factors of importance to spray drift are the effective height of agrichemical release (the higher the more risky), and the droplet size (the smaller the more risky).

Again the nature of reporting agrichemical trespass and the difficulty of determining a causal link make it difficult to identify the application method used in many cases. For a successful prosecution or damages case to be made a causal link must be made between damage, the agrichemical and the applicator. The causal link issue is explained in more detail in the law section. Research is being undertaken using unique tracers to link an applicator with the agrichemical applied.

There is a lack of information on the number of aerial versus ground-based applications of agrichemicals and this, together with factors such as the high visibility of aerial operations, makes it difficult to determine if particular application methods are causing most of the problems. Where the application method is reported up to half are caused by aerial applications.

In particular locations specific technologies have been identified as problematic. For instance, Tasman District identifies air-blast spraying as a main contributor to spray drift. Environment Bay of Plenty also identifies spray boom and air blasters as problematic.

The committee considers that information should be available to agrichemical users on the potential for different application equipment to cause spray drift.

d Applicator issues

The use of agrichemicals is not confined to the agricultural sector alone. Householders, road maintenance crew, lawn bowling clubs, golf clubs, schools, contractors, and aerial applicators all use agrichemicals. The type of agrichemical trespass problems encountered can reflect the purpose and situation of the application as well as the skill of the applicator.

There is anecdotal evidence to suggest that some applicators may be involved with more instances of trespass than others. In some areas the reported incidents of trespass involve the same applicator. Particular types of applicators mentioned in reports include: both aerial and ground contractors particularly roadside spraying contractors, pastoralists, and orchardists.

The committee considers that all agrichemical users should have some level of education and training in the use of agrichemicals.

Concluding comments

The information on agrichemical trespass incidents is poor and provides a variable quality of data. This means that the extent of the problems and exact nature of the issues is difficult to determine, and makes it more difficult to target a response. Each agency has its own data collection system (or absence of one), none of which interrelate. A system across agencies for collecting comparable data and a standard format for incident information is required. This needs to be complemented by information on the broader picture of agrichemical use.

Effects of agrichemical trespass

The effects of agrichemical trespass are discussed in four sections: health effects, property effects, other environmental effects, and other effects.

a Health effects

A range of effects on humans have been attributed to the use and trespass of agrichemicals. Some of these are well documented and accepted in the literature, such as acute poisoning effects. Others are contentious, such as the multiple chemical sensitivity syndromes. Good evidence from toxicology and epidemiology exists for some chemicals, while for others the evidence is weak or lacking.

The committee believes this is a key area of community concern. It is difficult to attribute these health effects to agrichemical trespass events, however, as the health effects described are seen as adverse it is unlikely that individuals expose themselves to the agrichemicals by choice. There is also an issue of the medical profession recognising effects, which is a prerequisite to be eligible for compensation, and for the reporting of health effects.

The health effects are discussed in four sections below: acute effects, long term effects, sensitivity issues, and issues for specific populations.

Acute health effects

The committee accepts that New Zealanders are experiencing acute health effects from agrichemicals but these are not being reported to the appropriate authorities such as Medical Officers of Health and the OSH service.

The Health Act requires medical practitioners who professionally attend a person and have reason to believe they are suffering a disease caused by "poisoning arising from chemical contamination of the environment", to report this to the Medical Officer of Health (section 74, Health Act). The committee is aware of only one report being received in the last five years.

The Hazardous Substances and New Organisms Act 1996 (HSNO) Act requires hospital administrators to report hospital admissions of persons suffering from injury caused by a hazardous substance to the Medical Officer of Health (section 143, HSNO Act) [this was incorporated directly from a provision in the repealed Toxic Substances Act]. The committee is not aware of any reports involving agrichemical trespass being received – not even from the highly publicised recent incident at Kohupatiki involving chloropicrin. This incident resulted in 25 people taken to hospital – one was admitted, and at least ten others were reported as seen by GPs (*see* case study on page 19).

The National Poisons Centre receives a steady stream of calls about possible poisoning from agrichemicals from both the public and medical practitioners. ACC data also suggests that some people may be being paid for agrichemical injury. It is not possible to determine from the data the proportion that relate to agrichemical trespass.

This under-reporting has the effect of concealing the true picture of health effects from agrichemicals and prevents any serious attempt to research or address the issues. The reason why no reports are received (when reporting is compulsory) urgently needs to be investigated and resolved.

This situation exists despite the Ministry of Health's investment in a system to investigate and monitor health effects from agrichemical spray drift incidents (Ministry of Health, 1998). The incidents are investigated by health protection officers, who are not registered medical practitioners, but who report to the Medical Officers of Health.

Long-term effects

It is difficult to quantify the chronic effects of agrichemical exposure, which can be from a single exposure with ongoing effects or from continuing exposure to an agrichemical. Historically it has been difficult to agree a causal relationship between exposure to a substance and a long-term health effect, e.g. asbestosis. No information on the New Zealand situation was available to the committee.

Sensitivity issues

It is generally accepted that about one in 8–10 people experience some form of allergic sensitivity to one or more environmental agents. Initiation of allergy occurs after a large exposure, but once allergy is established a person reacts to traces of the substance. Some people also experience sensitivity (without allergy) to substances in the environment. Again, reaction to very small exposures usually follows an initial sensitivity exposure. It is therefore conceivable that some people may experience sensitivity to agrichemicals. The whole issue of agrichemical sensitivity is not well supported by research or New Zealand data.

The committee asked Dr Ricky Gorringe, a complementary medicine practitioner from Hamilton experienced with agrichemical exposures, to present information on his approach to illness from agrichemical exposure. Two of the cases he has dealt with are detailed below, with the full text of his presentation in Appendix 4.

Dr Ricky Gorringe two case examples

1 A farmer suffered from an anaphylactic problem (severe allergic reaction) that required intravenous adrenaline treatment. After several anaphylactic episodes he was found to have levels of a breakdown product of 2,4,5-T and 2,4-D in his body, and with treatment, was successfully cured.

2 A 'townie' had moved onto a property with willow and gorse. She suffered fatigue, muscle pain, sore neck, retro-orbital pain and had headaches. It was found that unknown to her, her husband had sprayed the gorse and willow stumps next to the vegetable garden using a mixture of 2,4,5-T, Tordon and other chemicals. Her 2,4-D levels were off the scale and after treatment she was successfully cured of her symptoms (a complete account of Dr Gorringe's presentation is in Appendix 4).

While the committee cannot validate the claims made in these examples, it supports further research into use of complementary therapies for diagnosis and treatment of agrichemical exposure.

Health issues for specific populations

The HSNO regulations provide for Tolerable Exposure Limits (TELs) to be set for substances with toxic properties. The HSNO Act and the process for setting TELs is detailed in Appendix 6. The TEL is derived from a "no observed adverse effect" level from lifetime animal studies and the application of standard uncertainty factors. This approach predicts a safe level of a substance that does not cause a health effect. The assumptions made to derive the TEL are not universally accepted. Sensitive people may experience effects from a very small amount of substance. For instance one exposure of a pregnant woman to a substance may cause an effect on the foetus (e.g. there is said to be no safe level of alcohol consumption during pregnancy – one drink may have an adverse effect).

The effect of combinations of agrichemicals on people is also not covered by a TEL.

In principle, the committee considers that TELs are a step forward from the previous situation. However, it does not see TELs as the end point for regulating exposure to hazardous substances. Research should continue into methods to incorporate into the HSNO controls and TELs, factors of:

- exposure at physiologically vulnerable times (e.g. early foetal life)
- very low level exposure
- and, combinations of chemicals.

The hazardous substance controls under the HSNO Act have only recently come into effect and for agrichemicals the new controls do not yet apply, hence the practical effect of TELs is unknown. This will be an important area for future review.

b Property effects

There are examples of damage to property from agrichemical trespass and while some of these are documented, few end up in court as the affected party rarely takes any action to recover costs. One exception was the Geothermal Produce NZ Ltd (1987) case that successfully went to the Court of Appeal to recover costs of damage of around $700,000. Another was a recent Small Claims Court settlement for trespass onto a bio-dynamic avocado orchard with subsequent loss of certification (Organic NZ, 2001).

Anecdotal evidence suggests that punitive action is rare even when there is apparently a clear case of agrichemical trespass. This can be despite the affected party promptly notifying an enforcement agency, and property being clearly damaged. Enforcement agencies are still unlikely to take any punitive action in these cases because of the difficulty of achieving a successful outcome, both in terms of a court decision and recovery of costs.

Of the written reports available, it appears that damage often is not noticed until several days after the trespass event (or does not occur straight away), making the task of identifying the person responsible even more difficult.

The VegFed data shows a steady stream of incidents involving their members. The damage usually results in loss of production ranging from a few weeks of cropping, to having to replant crops.

Beekeepers report damage to hives as a result of agrichemicals. Although no national records are kept a number of incidents have been reported over the last few years (e.g. "Worker bees hit by poisonous sprays" *Waikato Times*, 16/11/1992). Damage occurs when agrichemicals are used on or near a flowering crop. Bee mortality can result in poor pollination of crops, loss of hives, and contamination of honey and therefore loss of income. The committee accepts that some bee deaths do occur from agrichemical trespass onto flowering crops. Generally though, mortality results from bees entering the spray application area and becoming poisoned, which is not a trespass issue and therefore not covered by this report. The key issue is that some applicators apply agrichemicals that are harmful to bees when plants are still flowering. As agrichemicals toxic to bees do have warnings on their labels this issue seems to be one of user education and enforcement.

The HSNO regulations provide for environmental exposure limits (EEL) for substances with eco-toxic properties. A substance must not exceed the EEL outside an application area. More details on EELs can be found in Appendix 6. The committee has concerns over the practical application of the EEL, for example, how will an applicator know when an EEL has been exceeded?

The committee also has concerns on how the EEL-setting process will address individual crop sensitivity or the needs of specialty crops such as organics. For example, while 2,4-D has little effect on grass, even a small amount will damage tomato crops. If EELs do not address crop sensitivity issues, how will they be addressed?

c Other environmental effects

There is little information available about the environmental effects of agrichemical trespass (i.e. a particular application) as such, most data relates to the general levels of agrichemical present in the environment. One exception is for the use of 1080 as outlined below.

1080 compound

New Zealand uses 1080 as the main possum control agrichemical and it has been relatively well studied. The Parliamentary Commissioner for the Environment's 1994 report on possum management details a number of effects of 1080 and other possum control agents. The environmental effects of 1080 have been studied to determine degradation rates and shows that 1080 degrades relatively rapidly in the presence of micro-organisms. Hence, in soil 1080 degrades rapidly but in plants or honey it does not.

The performance monitoring surveys undertaken after 1080 operations provide the best data on environmental effects of any agrichemicals used in New Zealand, particularly on non-target species and, occasionally, of off-target incidents. Spurr and Powlesland (1997) provide a summary of known impacts of 1080 on non-target species.

1080 can also cause secondary poisoning when a poisoned animal is consumed by another animal. Dogs are particularly susceptible to secondary poisoning from 1080 and there are many documented cases of this occurring (e.g. *Evening Post*, 22 December 2001).

Surface water

Numerous studies of surface water quality have been undertaken after 1080 poisoning operations. Most of these have followed aerial applications but more recently studies following ground applications have been done. A study in 1993 (D Meenken, 1994) took 66 surface water samples over four months following an aerial 1080 application and found no traces of 1080. A study in 1999 following ground application of 1080 took 52 surface water samples over the application period and during rainfall events, and found no traces of 1080 (D Meenken, et al, 2000). This report provides a good summary of water monitoring studies following 1080 application.

As an example of the importance of studying environmental effects post-application, one overseas study shows that the pesticides detected most frequently in a study area, particularly in surface water samples, were among those applied in the greatest quantities. The same study found persistent pesticides were more likely to be found in stream sediments and fish samples (*Water Quality in the Lake Erie-Lake Saint Clair Drainages*, Myers et al, US Geological Survey Circular 1203, 2000). This work pinpointed the specific chemicals, crops and the users that required a targeted response in order to reduce environmental effects. Data to support similar conclusions in the New Zealand context is not available.

The committee has not looked at other New Zealand studies of agrichemicals in surface waters.

Ground water

This information relates to general agrichemical contamination of ground waters and not to specific applications of agrichemical.

There have been three national surveys of pesticide contamination of ground waters since 1990 (Close, 1993, 1996; Close and Rosen, 2001) and the *1997 State of the Environment Report* (Ministry for the Environment) summarised available information on pesticide contamination of New Zealand's ground water resources. In general it would appear that the majority of our ground waters are relatively free from pesticide contamination. However among high-risk sites (shallow ground water, free draining soils and/or high pesticide use) some 15 percent of sites have been found to contain pesticides (Close, 1993, 1996). In most cases, where detected, levels have been low and within acceptable health limits. In a few cases levels have exceeded acceptable health guidelines for drinking water (Lee et al, 2001).

In the 2001 survey, 100 wells were sampled throughout New Zealand using much lower detection limits than in previous surveys. Pesticides were detected in 30 percent of wells; of those, 66 percent of the pesticides detected were triazines. A total of 20 different pesticides were detected. Only one sample exceeded the drinking water standard. The Himatangi study (ibid) was to assess the confidence with which we can make predictions about the fate of pesticides and to choose the most appropriate model as the basis for predicting the contamination risk to ground waters through the application of pesticides to soils under different land management practices.

Several ground water indicators have been suggested for the national environmental performance indicators monitoring. This monitoring uses a pressure-state-response framework to assess the environment. Pressure indicators include the amount of triazine pesticides applied to land (or produced or imported), and for state indicators the amount of atrazine present in ground water (Rosen et al, 2001).

d Other effects

At a broader level, incidents of agrichemical trespass that potentially cause pollution and long term contamination impact on cultural and spiritual values. In terms of Maori values, this can be seen as a breach of the responsibilities under sections 8 of the HSNO and Resource Management Acts to take into account the principles of the Treaty of Waitangi.

Case Study: Kohupatiki, Hawke's Bay – October 2001

Beginning in the early evening on 1 October 2001, residents around Kohupatiki Road, near Clive, experienced a mixture of symptoms including watering eyes, sore throats, chest tightness, coughing, headache and nausea. After discovering that the effect was being felt at a number of residences, emergency services were notified at 9.30 pm.

A soil fumigant, containing chloropicrin, had been used to treat about 5 hectares of nearby orchard land. Chloropicrin has an intense penetrating odour that easily produces tears and other symptoms, even at low concentrations. Only a few contractors nationally use chloropicrin for specialised fumigation purposes. The contractors generally must be well trained.

Soil fumigation is a common practice when replanting apple trees in previously used apple orchard soil and is usually a safe, self-contained procedure. The fumigant is injected into the ground, which is then sealed, with the aim of retaining it for a sufficient period so that all target micro-organisms are eliminated. The fumigant then slowly releases to the atmosphere, is dispersed by wind and broken down by ultraviolet light. However, this time the fumigant escaped rapidly from the soil forming a low-lying cloud (as it is heavier than air), which settled in the natural depression around the houses. Cold atmospheric conditions forming an inversion layer made the situation worse.

Many agencies were involved: the fire service, police, and ambulance provided the emergency response; members of the Hazardous Substances Technical Liaison Committee assisted – the regional council, OSH and the territorial authority (the HSTLC exists to deal with this type of incident); as well as the fumigation contractor.

Twenty houses were evacuated overnight. At least 35 people suffered health problems from this incident, with 25 people being treated at hospital and the rest reported as seen by GPs.

The following night the returning residents noticed the symptoms again, although to a much lesser extent. Emergency services were again called and four people were treated by ambulance at the site but no evacuation was ordered. On 3 October public health and OSH staff monitored the situation on site but no adverse effects were noted.

The follow-up

The Ministry of Health investigations found that chloropicrin is not covered by the fumigation regulations when used in agricultural settings, as in this case. The regulations are currently being considered for amendment.

After its investigation, the Hawke's Bay Regional Council was satisfied that no long-term environmental effects would occur. The council also considered whether its regional plan rules had been breached and as a result is prosecuting the contractor.

The OSH service investigated the incident in relation to whether the chloropicrin use met the requirements of the Health and Safety in Employment Act, particularly regarding training and identification of hazards. A prosecution will result.

The Environmental Risk Management Authority (ERMA), which has a monitoring role in this situation, has received reports from some enforcement agencies about this incident. They have conducted a staff investigation, which is used to determine if any changes to transitional management of chloropicrin under the HSNO Act is necessary. ERMA can review the labelling of the container.

The community of Kohupatiki have also held two public meetings to discuss the incident.

Conclusions

This case study clearly illustrates the complexity of agrichemical trespass issues.

In this instance several of the usual problems don't occur, i.e. what the substance was, where it came from, who applied it was all known. Each of the emergency services was called to the scene highlighting the importance of co-ordination of the initial response.

The subsequent follow-up involved key HSNO enforcement agencies (OSH and public health) and the regional council. Careful consideration of the basis for and likely success of prosecution meant decisions on enforcement action took at least two months. Several different laws are involved.

It is unclear whether those who had to leave their homes, or had their health affected have received, or will receive, any compensation.

The final decisions on whether the regulation of chloropicrin, or training in its use, is adequate will depend on the outcome of the prosecutions. The contractor has pleaded guilty in the Regional Council prosecution.

3 The New Zealand Framework

The New Zealand framework of matters that relate to agrichemical trespass include:

- agrichemical use in New Zealand
- the expectations of the stakeholders
- the expectations of the partners to the Treaty of Waitangi
- the laws that control aspects of the use of agrichemicals.

Agrichemical use in New Zealand

To gain an understanding of, and target solutions for agrichemical trespass, an overall picture of agrichemical use in New Zealand is essential. This should allow, for example, the rate of incident for particular agrichemicals to be related to the amount of the agrichemical used. Similarly, the levels of particular agrichemicals should be related to the amount of agrichemical used in an area. Accordingly, regular, systematic New Zealand-wide and local studies of agrichemical use patterns and environmental effects need to be undertaken to understand agrichemical impacts.

The latest comprehensive report on pesticide use in New Zealand is a 1999 review by Holland and Rahman. Previously, the last systematic study of agricultural pesticide use in New Zealand was carried out for the period of 1985-88 (*Patterns of Pesticide Use in NZ: Part 1*, RJ Wilcock, 1989).

The Holland and Rahman report is largely based on information supplied by Agcarm Inc of pesticide sales data. It shows the tonnage of the different pesticide categories used in New Zealand and by comparison with earlier surveys has determined some trend information. It also shows how much and what type of chemical is used in the different agricultural sectors, e.g. pastoral or fresh vegetable sectors. Statistics New Zealand also collects some data on areas of land in various horticultural crops and this was incorporated to give a picture of kg/hectare/crop of pesticide use. The report does not attempt to integrate the data with environmental indicators.

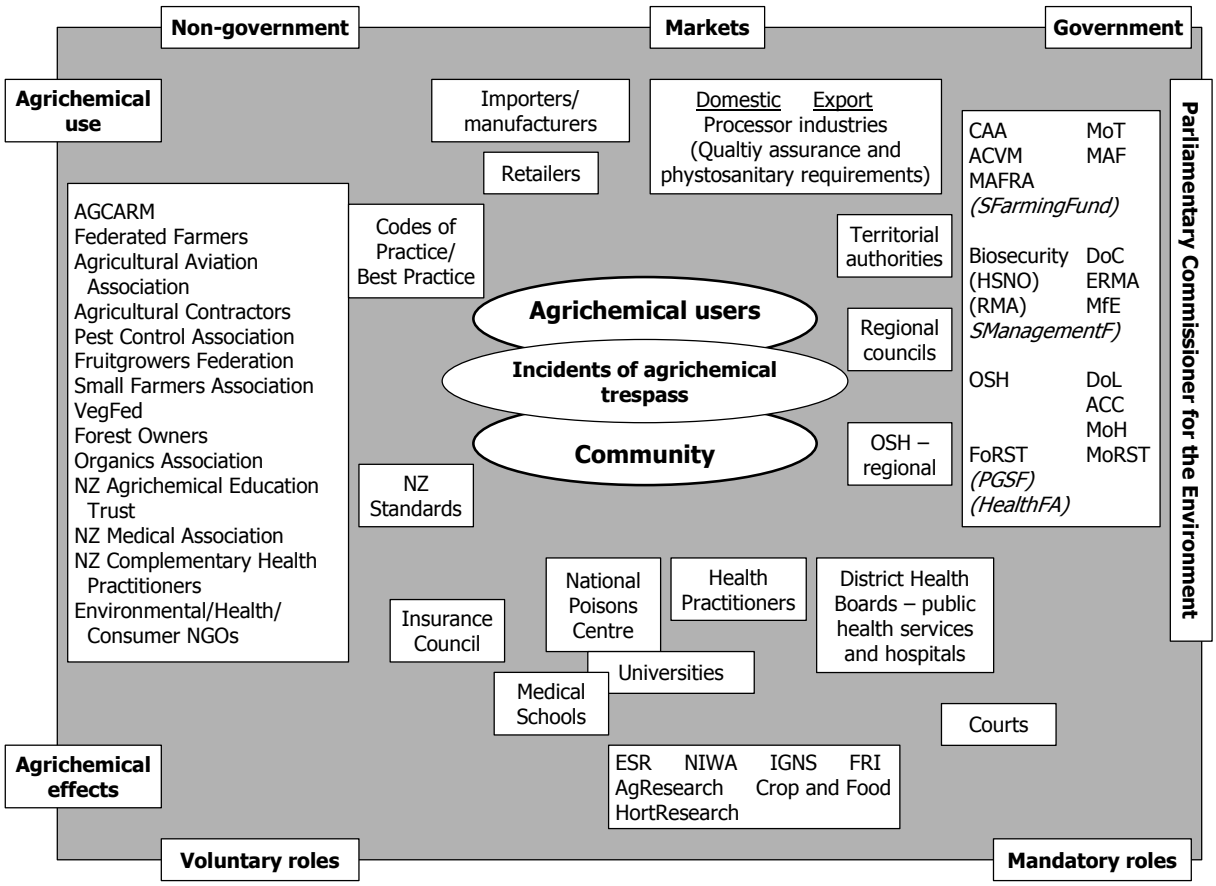
From the available information it is clear that agrichemical use is changing over time, with tonnage use peaking in 1994 and declining to the latest 1998 figure. The types of chemicals used are changing also. This change in use has important implications for environmental indicator and monitoring programmes, as to be an effective policy response tool they need to monitor current chemical uses.

New Zealand does not have a system in place to gather this data on a regular basis in a consistent, comparable form, either at a national or regional level. No information is gathered on non-agricultural use of agrichemicals, for example roadside spraying or domestic use. It is therefore difficult to determine from agrichemical usage data where problems are likely to occur.

The stakeholders

There are a large number of parties with an interest in agrichemical trespass as shown in Diagram 2. They are not well co-ordinated but interact in various ways, and are clustered in many different groupings from: users of the agrichemicals to those interested in the effects of agrichemical use; non-governmental and government agencies; and, those with a mandatory role in managing agrichemical use and trespass incidents to those who have a voluntary function. There is no one agency or group of agencies with legislated or voluntary responsibility to manage all aspects of agrichemical use or trespass. In addition, the categories are not mutually exclusive, agrichemical users are themselves sometimes subject to agrichemical trespass from other users. The following briefly explains the role of three stakeholders:

Diagram 2: Stakeholders involved in agrichemical trespass



Industry groups

Industry groups play an important role in educating their members and providing industry standards of practice such as codes of practice. The level of activity of the associations varies as do their mode of operation. The *NZS 8409: 1999 Code of Practice for the Management of Agrichemicals* is a good example of a co-operative venture by various industry associations to produce an industry standard document.

Processing and export companies

Several processing or export companies require growers to meet certain standards of agrichemical management as part of their quality assurance programmes. Kiwigreen, in the kiwifruit sector is one of the longer running programmes. Many of these programmes are driven by the expectations of consumers, retailers and exporters.

National Poisons Centre

The National Poisons Centre is part of the Department of Preventative and Social Medicine of Otago University. The primary purpose of the National Poisons Centre is to provide emergency advice on the management of poisoning events, and to do this keeps an extensive database of information on chemicals and plants. The Centre is an important source of this information for both lay and medical people. The Centre keeps records of all emergency telephone calls it receives.

The Centre has no direct responsibilities under the HSNO Act or relationship with the Environmental Risk Management Authority (ERMA), and therefore no function to report data to ERMA.

The Treaty of Waitangi

The Treaty of Waitangi, signed in 1840, was largely an instrument to help the formation of an administration and protectorate under the governance of Queen Victoria for the settlement of New Zealand. This being understood, Maori chiefs signed their agreement. That signing, and the status of the Treaty, are held in prominence by Maori and New Zealand governments as they continue to forge a future for New Zealand. The Treaty consequently is a *living* document that accords a dynamism for New Zealand and its future.

The Treaty of Waitangi is specifically referred to in both the RMA and the HSNO Act. In the RMA it states:

> *s8 Treaty of Waitangi – In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).*

The HSNO Act states:

> *s8 Treaty of Waitangi – All persons exercising powers and functions under this Act shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).*

Maori have a strong spiritual connection with the realm of Taane Mahuta and Rongomataane. Maori believe their world view should be accorded respect and standing in these specific realms. Tikanga Maori (traditional practices such as rahui) reflect the values of balance, life-force, care-taking, and duty of care.

The provisions of Article Two of the Treaty of Waitangi provide that Maori have joint management responsibility, based on these cultural practises, and accordingly they want to be active participants at all levels as a Treaty partner.

A Maori world view

(contributed by committee member Percy Tipene)

Maori culture is based on ecological science passed down through generations as spiritual folklore.

Modern science is still coming to terms with ecology, and therefore the ecological wisdom of Maori spirituality. Because of the failure of people in positions of authority to understand this, government agencies have paid only token regard to Maori cultural concerns, matched in futility only by those Pakeha who offer token support but cannot explain why, and whose arguments are thus wasted.

Maori cultural concerns should be considered as true environmental concerns, not only because Maori view the environment as a spiritual entity, but also because it is in line with proper practice.

The following extracts from the *NZ Standard 8409: 1999 Code of Practice for the Use of Agrichemicals* can be viewed in conjunction with Maori culture:

Section 2.1: Risk management

The essential parts of a system to manage any risks include:

(a) Clear allocation of responsibilities

(b) Accurate and up to date information on the characteristics and properties of the agrichemical, its effects on human health and the environment, and the risks to trade in primary produce, animal welfare and biosecurity.

(c) Proper documentation

(d) Adequate education and training of agrichemical users.

Section 2.3.1 Identification of need

The decision to use an agrichemical shall only be made after considering all other practicable alternatives. Accurate identification of the problem before the application, use or administration of any agrichemical is an integral part of managed agrichemical use. Agrichemicals shall be used only in response to an identified need ...

Section 5.2 Notification of agrichemical use

Any person who may be affected by the use of agrichemicals has a right to information about what agrichemicals have been, or are to be used, and notification should be used to achieve that.

Under the Treaty, Maori can demand all of these requirements to be met, and if they are properly considered the concerns relevant to Maori may not be totally eased but will be considerably reduced.

Historically Maori have been worse off from the widespread application of agrichemicals. Maori have been exposed to dioxin not only from exposure in rural areas and in forestry, but through run off to traditional harvesting grounds of kaimoana (seafood). This toxic burden is possibly peaking in people about 50 years of age so has yet to show its full effects as the population ages.

Considered wisdom at the time was that herbicides containing dioxin were safe and necessary for economic progress, yet both reasons have proved to be wrong. If Maori cultural concerns, and the principles from the NZS 8409:1999 applied before the widespread use of these herbicides, Maori would be healthier and the environment cleaner. For example, according to the Ministry for the Environment's *Report on Persistent Organochlorines in New Zealand* (1999), Northland pastoral soils have the highest levels of dioxin in the country; this is attributed by the report to the use of 2,4,5-T herbicide.

So Maori can rightly demand that their cultural concerns over the adverse effects of agrichemical trespass are also valid environmental and health concerns.

Although many toxic agrichemicals are gone from use, plenty remain. Organophosphates, and any volatile agrichemical, are examples of health issues. The reliance of New Zealand toxicologists of the "dose makes the poison" theory based on the 16th century physicist Paracelsus is in contradiction with overseas research, and disguises the true effect to health from many agrichemicals.

It may be impractical for Maori to demand zero or nil tolerance from chemical trespass; but it is very practical for them to demand vast improvement on the current situation. Strict adherence to NZS 8409:1999 would address some of the concerns of Maori, and the environment, but this is prevented because there is no feasible enforcement provisions for this voluntary code. Such provisions should include:

- qualified persons to investigate and act on breaches of the code
- comprehensive education on responsible plant protection uninfluenced by agrichemical manufacturers
- government funding for these measures
- the translation/awareness of technical information so that our people can better understand the impacts.

Maori can demand by virtue of HSNO section 8 and the RMA section 8 that effect be given under the Treaty to NZS 8409:1999, especially the means to see its provisions fairly enforced.

This overview highlights the understanding Maori have as Treaty partners for the integration of our values into the legislative laws.

Kia Ora

In considering agrichemical issues and Treaty matters the committee agrees with the above recommendations to have adequate enforcement, education, funding and communication of technical information. The committee agrees that the aim of agrichemical applications should be to deposit the substance only on the target area and have no agrichemical trespass.

The law

There are a number of inter-related aspects of law in New Zealand that address issues of agrichemical trespass, each in its different way. These laws include the RMA), the HSNO Act, the Health Act and regulations (e.g. fumigation regulations), the Health and Safety in Employment Act, and the Civil Aviation Act. Each of these is outlined below as far as they impinge upon agrichemical trespass issues.

Two key pieces of legislation deal most directly with management of agrichemical use to prevent agrichemical trespass, and to deal with the consequences should a trespass occur. These are the RMA and the HSNO Act, a summary of relevant provisions in these Acts can be found in the appendices.

The Resource Management Act 1991

The purpose of the RMA is to promote the sustainable management of natural and physical resources, and includes avoiding, remedying or mitigating any adverse effects of activities on the environment. It achieves this through both site-specific and activity-based controls and policies. More detail on the RMA is provided in Appendix 7.

Controls on discharges in regional plans often include rules that permit agrichemical use provided certain conditions are met, e.g. the application rate shall not exceed the manufacturers instructions.

Controls on the use of land can include separation distances to try to physically separate incompatible land uses, such as intensive farming activities and residential buildings. These controls are contained in district or unitary plans.

Two studies were undertaken to gain a better understanding of the provisions in resource management plans that aim to prevent agrichemical trespass or control agrichemical use. One study undertaken by the Ministry for the Environment (2001), looked at the provisions in regional plans and the other study, undertaken by Harrison Grierson (2001), reviewed provisions in selected district plans [*see* Appendix 8 for more details]. These studies showed that regional and district plans do make provision directly or indirectly to address agrichemical trespass issues.

Resource management plans

Resource management plans address agrichemical trespass issues through controls in two areas: land use and discharges. Land-use controls are contained in district plans and discharge controls are contained in regional plans about air quality. Unitary authorities have the advantage of integrating controls for both land use and discharges in the one plan.

Land-use controls

Section 75 of the Resource Management Act prescribes the contents of district plans. District plans are intended to contain a "nested hierarchy" of issues, objectives, policies and methods. The objectives and policies are high-level statements. The methods include both rules and other non-regulatory means.

The survey of selected district and unitary plans (Harrison Grierson 2001) showed that half of the district plans surveyed included some direct provisions addressing "spray drift". Provisions cover objectives and policies, and methods including rules. Most of these provisions are included in district plans to address a much broader area of concern than just agrichemical trespass or use.

The provisions can either directly or indirectly provide for agrichemical trespass mitigation. There are two main categories of indirect provisions: those that control the form and density of development, and those that recognise "reverse sensitivity" issues. Reverse sensitivity is a term that refers to the phenomena of new developments, particularly in rural areas, experiencing adverse effects from existing off-site activities, e.g. increasing dwelling density in rural areas exposes newcomers to the full impact of rural noises, smells and stock on roads.

Land-use provisions in plans include:

- a policy to ensure that rural activities do not give rise to adverse effects without separation or other mitigation measures (CCC policy 13.4.3)
- an implementation method to promote the use of NZS 8409:1999 (Hurunui policy 10.9)
- a rule for production forestry that requires a "setback" of 50 metres adjacent to housing. This can be reduced with the written permission of the neighbouring property owner (Kapiti rule D2.2.1)
- a performance standard to use NZS 8409:1999 to avoid adverse effects of hazardous substance use (Hastings rule 13.8.8.8)
- a policy that seeks to control intensive farming practices to provide high amenity values for rural residential living in particular areas (Hastings policy RUP8)
- a specific section on offensive odours, effluent aerosols and spray drift. A rule is included that provides a minimum "setback" distance of 30 metres, which can be reduced if potential adverse effects are accepted. This would then be recorded on land information memoranda (Western Bay of Plenty 2.3.5)
- a rule making aerial agrichemical application a non-complying activity within 500 metres of a rural and residential boundary. The explanation states "this does not limit the legitimate use of rural land for farming as alternative means of topdressing/spraying may still be used, for example applying 'GROWSAFE® code of practice methods'" (Matamata Piako 4.7)
- a policy that states rural activities should be undertaken so that potential soil contaminants are used in accordance with appropriate standards and the cumulative effect of use is considered before application. The NZS 8409:1999 is again mentioned (Rodney policy 7.4.14)
- controlling the minimum area of subdivision allotments in a rural area to 12 hectares and providing minimum frontage standards in rural residential allotments (Tasman rule 16.3.7(b) and 16.3.10(ba))
- a rule controlling the minimum area of subdivision in the main rural area to 2 hectares (Far North rule 8.6.5.4.1).

Land-use controls are useful to control agrichemical trespass in as much as they can help control the adverse effects of conflicting land uses. Two key methods are the application of minimum subdivision areas to maintain low-density housing in rural areas, or the prohibition of intensive agriculture in rural-residential areas/zones. Separating uses is another key method by use of setbacks. While buffer zones were frequently used there were no requirements for live shelter belts. One plan noted any variation from these requirements on land information memoranda. However, none of these methods solve the problem of agrichemical trespass where the land use patterns are similar or where the patterns are already established (i.e. existing use rights will

apply and there is no mechanism to impose rules retrospectively in the context of district plans).

Discharge controls

Section 63 allows for the preparation of regional plans to assist a regional council carry out any of its functions, which include the control of discharges of contaminants into or onto land, air or water. Regional plans also contain issues, objectives, policies and methods including rules.

Ministry for the Environment staff surveyed regional plans for provisions on agrichemical trespass. Fourteen of the sixteen regions have a plan that covers air discharges. Some of these plans are still progressing through the formal adoption process. Canterbury region is in the process of drafting a plan to cover air discharges. The following table sets out in brief the types of rules found in each plan.

Table 7: Summary table of regional plan rules

Rules	Taranaki	Hawke's Bay	Southland	Wellington	Manawatu/Wanganui	Northland	Tasman	Marlborough	Hawke's Bay RM 2001	Gisborne	Bay of Plenty	West Coast	Otago	Waikato	Auckland
Rules to prevent off-target agrichems	•	•	•	•	•	•	•	•	•	•	•	x*	•	•	•
Use of agrichems permitted with conditions	•	•	•	•	•	•	•	•	•	•	•	x	•	•	•
Control chemical used						•				•					•
Applicator requirements		G	•	G	G	G	G	G	G	G			G	G	G
Application controls:															
• notification	•	•		•	•	•	•		•	•			•	•	•
• signage	•			•	•				•	•			•	•	
• keep records	•	•		•			•	•		•				•	
• spray plan including sensitive areas		•		•	•	•		•	•					•	•
• report incidents	•			•				•		•	•				
• protect waterways				•	•		•	•	•					•	
• follow manufacturer instructions	•	•		•	•		•	•	•				•	•	•
• use best practicable option	•					•					•				
• comply with GROWSAFE® code		•			•			•	•	•	•		•	•	•
No drift allowed									•						•
Distinguish hire and reward/commercial			•			•								•	•

* West Coast – fumigation is a discretionary activity; Taranaki – fumigation is permitted provided no noxious effects; Wellington – fumigation is a permitted activity provided there is no drift beyond boundary.

G = GROWSAFE® training required.

Although the approach to management of agrichemicals differed across the country, most regional plans deal comprehensively with agrichemical use. Most regional plans are relatively new, only a few years old, and probably require further promotion to achieve maximum impact. This may be reflected in the high level of information and education used to address complaints and induce compliance. Hawke's Bay Region is preparing a "second generation" plan, incorporating the air plan into a general resource management plan.

The above table shows the key elements in management of agrichemicals through regional plans. Relevant training of all applicators is seen by this committee as a key method to improve agrichemical use. In particular those using large volumes of diverse substances and in diverse situations (such as hire and reward contractors) should have higher qualifications. The provision of adequate training is also a requirement of a good employer under the Health and Safety in Employment legislation.

The use of spray planning is also advocated, as part of good management practice and a good method to identify sensitive areas. Spray plans could provide the basis of information for notification purposes.

Notice to affected persons and providing signs in public places are also seen as key so people can reduce adverse effects themselves. The provisions in the regional plans vary in this regard, which may cause confusion to applicators working in more than one area. Some notification regimes may also prove to be more workable than others. For instance, some plans only require notification once a year, others require notice one week prior to use (the same as NZS 8409:1999), other plans at least eight hours and not more than one week prior to use. Some plans require written notice and others are more flexible. There are some differences in notification required between application on private properties, and application on public land and roadways. New technology could be better used, for example, Telecom provides a business Message Manager service that allows up to a three-minute message to be delivered to a pre-programmed distribution group of several hundred numbers for a starting fee of $25 per month.

The committee recommends that regional councils develop a consistent approach to notification that is suitable for regional needs and recognises both a user's right to use agrichemicals and the public's right to know what is being used.

Reference to the NZS 8409:1999 was made in most plans, although not always in the rules, to provide the best practice model for applicators to meet. Most plans required agrichemical users to follow the manufacturer's instructions or label requirements. This means it is important for both the NZS 8409:1999 and manufacturers to provide the best information available and to update and refine information.

Both land use and discharge plans use different methods to reduce agrichemical trespass and stakeholders need to be aware of them. Best practice methods should generally be well known to users.

The committee is aware of only one prosecution under the RMA for agrichemical trespass. Not only are there few prosecutions, there is also a very limited use of enforcement orders, abatement notices or infringement notices. The particular reasons for this are difficult to ascertain; it does not appear to be a lack of trespass incidents (looking at Tables 1–6). It is likely to be a range of factors including level of proof required for prosecution, delays in reporting agrichemical trespass incidents, funding adequacy for enforcement work, etc.

The range of enforcement provisions in the RMA recognises that offences against the Act can range in nature from minor to very significant. In essence, there is a hierarchical range of mechanisms to suit the offence, ranging from infringement and enforcement notices, abatement notices and prosecution. The maximum penalty for breach of the Act can be up to two-years' imprisonment or a fine of up to $200,000.

Infringement notices under the RMA

Infringement notices have been available under the Resource Management Act regulations since February 2000. They are basically an 'instant fine' similar to a traffic speeding ticket. Infringement notices are available for the minor level of offences with fines paid directly to the enforcement agency. Infringement notices are only available for the offences specified in the regulations. If served with one of these notices by a council, a person has 28 days to either pay or to request a hearing in the District Court. If a hearing is requested then the person served may either admit liability but argue for a reduced fine or not admit liability.

Most agrichemical trespass situations will relate to non-compliance with regional plans and controls on discharges under section 15(2), which is covered by the infringement notices regulations. This could attract an infringement fine of $300.

Councils appear to use infringement notices when the effect of the offence is small or minor and the case is straight forward. There is anecdotal evidence to support the view that infringement notices can act as a deterrent against further offending. However, they do need to be used wisely as there is also evidence to suggest that many "offenders" will simply pay the fine and get on with business. This latter attitude might not have the desired effect of focusing the attention of the offender on preventative management.

An infringement notice can be a more effective and efficient tool to achieve deterrence in dealing with lower-order agrichemical trespass than taking criminal or civil proceedings. However, it should be noted as there are no provisions for damages under an infringement notice, infringement notices are best used for minor spray drift incidents. Significant damages or injury should be a trigger for the initiation of a more robust prosecution process.

The Hazardous Substances and New Organisms Act 1996 (HSNO Act)

The following provides an overview of the HSNO Act requirements relating to agrichemical trespass. More detail is provided in Appendix 6.

The purpose of the HSNO Act is to protect the environment, and the health and safety of people and communities, by preventing or managing the adverse effects of hazardous substances and new organisms. For hazardous substances, it will achieve this through substance-specific assessment of, and controls on their use. The HSNO Act will cover all agrichemicals as defined in the ATMAC terms of reference as hazardous substances.

The HSNO Act sets up the Environmental Risk Management Authority (ERMA) as the key agency to assess and impose controls on hazardous substances. ERMA may also:

> *11(b) Monitor and review –*
>
> > *(i) The extent to which the Act reduces adverse effects on the environment or people from hazardous substances or new organisms:*
> >
> > *(ii) The enforcement of this Act ...*
>
> *(c) Promote awareness of the adverse effects of hazardous substances and new organisms on people or the environment and awareness of the prevention or safe management of those effects:*
>
> *(e) Enquire into any incident or emergency involving a hazardous substance or a new organism:*
>
> *(f) Keep such registers relating to hazardous substance and new organisms as may be required by this Act or as may be necessary to administer this Act:*

To help with carrying out enquiries, ERMA has a power to request information (s 24 HSNO Act) from any relevant person, but there is no penalty for not providing this information. In addition hospitals are required to notify the Medical Officer of Health of admissions of persons with a hazardous substance injury (s 143), and every responsible person is required to notify the appropriate enforcement agency of incidents (s 144). ERMA is required to present all this information in its annual report.

The HSNO Act is enforced by a range of agencies (s 97) already having some function in the management of hazardous substances or new organisms. They are the Occupational Safety and Health service, Ministry of Health, Civil Aviation Authority, Maritime Safety Authority, Land Transport Safety agencies, New Zealand Police, Gas Act enforcement agencies, and territorial authorities.

The HSNO Act provides a suite of controls to be applied for the use of agrichemicals in an "application area" (i.e. on-target), and exposure levels (Tolerable Exposure Limit and Environmental Exposure Limit) not to be exceeded in other areas (i.e. off-target). Specific controls to be applied for use in an application area include equipment standards and record keeping requirements.

The HSNO Act was designed to address some of the problems associated with agrichemical trespass such as, for the first time, providing a maximum allowable concentration of agrichemicals in the environment. It will no longer be necessary to prove damage, for instance in civil cases, where concentrations are found to be over the TEL or EEL. Proof will still be required of the cause.

However, the hazardous substance part of the Act only came into force in July 2001 and as there is a long transition period there has been no opportunity to assess how well these provisions work in practice. The controls afforded by these regulations will not apply to agrichemicals currently in use until the transfer process during the transition period is complete. The controls will apply to approved new agrichemicals immediately.

The HSNO Act provides for infringement notices to be developed in regulations, similar to the notices provided under the RMA. These would be used for lower order offences, suitable for some agrichemical trespass situations.

Section 143 provides for notification of hazardous substance injuries of any person admitted to hospital, and section 144 requires persons in charge of hazardous substances to report incidents to an enforcement officer.

There are a number of useful provisions in the HSNO Act that should improve agrichemical management and thereby avoid agrichemical trespass. ERMA also has the opportunity to ensure controls are adequate when substances are transferred to the new regime. The ability to take enforcement action should be improved by the existence of exposure limits. However, this will be dependent on the application and implementation of the HSNO controls to new and transferred substances, and for compliance and enforcement with the new regime. Key, will be adequate funding for the above activities and a comprehensive education process to ensure all users are aware of the new requirements.

The process to establish the Tolerable Exposure Limit (see Appendix 6) raises some concerns in that it is based on a life time exposure and does not address issues for certain populations, e.g. pregnant women. This is an important consideration, as people do not have the choice to be exposed to agrichemical trespass.

The other area that requires urgent development is how the EEL will work in practice, i.e. how will an agrichemical user know when the EEL has been reached; how will users assess the impact of cumulative applications possibly by different people. Codes of practice currently deal with best practices to achieve desired environmental outcomes (among other things) but do not measure the outcome. An EEL can be a method to measure the environmental outcome, provided the information is available to the user. Codes of practice are used by individuals and give no guidance on how groups of users should behave, for example, to not exceed an EEL. The committee sees this as a key area for development.

The HSNO Act and the RMA – how they will interrelate

The RMA and HSNO Act are designed to work together, providing substance life cycle controls (HSNO), together with additional, possibly more stringent site-specific controls (RMA). The HSNO Act section 142 sets out the relationship with other Acts and in particular the RMA. All persons exercising powers or functions under the RMA relating to the use of hazardous substances must comply with the HSNO controls, and resource management plans are able to impose more stringent requirements, e.g. several plans identify sensitive areas where agrichemical use is more tightly controlled.

The penalties in both Acts are significant: HSNO has a maximum $500,000 fine or three months' imprisonment and $50,000 daily for a continuing offence; the RMA has a maximum $200,000 fine or two years' imprisonment and $10,000 daily for a continuing offence. Currently infringement notices are only available for "spray drift" incidents under the RMA and are discussed above.

As the HSNO Act controls for hazardous substances are relatively new and will not take effect until the transfers are completed it is difficult to assess how well the interrelationship between these two Acts will work. Regional plans will be the key to developments in prevention of agrichemical trespass in specific areas.

Both Acts have a range of enforcement mechanisms to use when breaches of the controls occur. Under section 97 of the HSNO Act territorial authorities are enforcement agencies and will enforce HSNO controls in public places and may also enforce HSNO controls when undertaking RMA enforcement. Regional councils have no enforcement or compliance role and no direct relationship with ERMA. This is despite being primarily responsible for the management of environmental effects from discharges including agrichemicals, the preparation and application of the key regional resource management plans, and in many cases, being the first point of contact for complaints about agrichemical trespass. Having many points of contact with the primary production sector and the community, regional councils have a wealth of opportunities for promoting good practice.

The committee believes that regional councils should have a role under the HSNO Act that should at least include a statutory relationship with ERMA to provide agrichemical trespass incident data, but preferably would also enable regional councils to enforce HSNO controls while undertaking RMA enforcement.

Health Act 1956

Local authorities have a duty under section 23 of the Health Act 1956 to improve, promote and protect the public health within their district. This includes making regular inspections to ascertain if any "nuisances, or any conditions likely to be injurious to health or offensive exist in the district", and to secure abatement of those conditions. They are able to appoint environmental health officers to carry out these functions and may make bylaws to assist in protecting the public health.

Section 60 of the Health Act makes it an offence to directly or indirectly cause pollution of a water supply so that it is dangerous to health or offensive or unfit for domestic use. Similarly, it is an offence to pollute any watercourse that passes through an urban area, whether or not it is part of the local urban water supply, unless it can be shown not to be dangerous to health.

Section 29 of the Health Act 1956 specifies the circumstances in which activities can be regarded as a nuisance, namely when they are "offensive or likely to be injurious to health". District Court action to abate a nuisance is authorised by section 33 of the Act and section 34 allows an environmental health officer or district engineer to abate a nuisance without notice and to recoup costs from the owner or occupier.

Under section 136 of the Health Act, general penalties, are a maximum of $500 and $50 for each day an offence continues.

Section 74 of the Health Act requires every medical practitioner to report every case of a notifiable disease on the basis that they have reason to believe, or the symptoms create a reasonable suspicion, that it is a notifiable disease. That is, they do not require proof positive. Notifiable diseases are set out in the Second Schedule to the Act and include poisoning arising from chemical contamination of the environment. This could include agrichemical poisoning.

The Health Act is relatively dated and is currently under review by government. It appears to have been little used to address agrichemical trespass issues. Compliance with the requirements for reporting notifiable disease under section 74 is also lacking and has been discussed above.

Fumigation Regulations 1967 and amendment

These regulations are made pursuant to the Health Act and prohibit fumigation except in accordance with the regulations. The regulations apply to a list of fumigants including methyl bromide and chloropicrin. However, they specifically exclude production land from key controls. This meant that in the recent incident at Kohupatiki where chloropicrin was used as a soil fumigant (see case study on page 19) the fumigation regulations did not apply.

The committee sees this as an anomaly that should be quickly rectified whether this is by amendment of the fumigation regulations or incorporation into the HSNO controls.

Health and Safety in Employment Act 1992

The principle object of this Act is to provide for the prevention of harm to employees at work and is administered by the Occupational Safety and Health Service (OSH) of the Department of Labour. The Act places duties on employers to identify hazards and to eliminate, isolate or minimise those hazards and protect workers. It also places a duty on employers, self-employed, those in charge, principals and employees to avoid harm to other persons. Section 25 requires instances of serious harm to be notified to the Secretary of Labour.

For agrichemical trespass this means that those in charge should eliminate, isolate or minimise off-target application of agrichemicals, and should avoid harm to both workers and other people.

OSH has prepared several guides to agrichemical use covering personal protection measures, forestry uses, farm chemical handling and organophosphates.

Civil Aviation Act 1990

The Civil Aviation Act and the rules made pursuant to it establish the operation of the civil aviation system in order to promote aviation safety. This includes control of the application of agrichemicals from an aircraft.

Section 97 of the CAA states that an aircraft does not commit a trespass by reason only of its flight over a property, so long as it complies with the Act and is at a reasonable height. However, damages can be claimed if something falls from an aircraft. Application of agrichemicals in a target area is exempt from this general requirement, providing certain conditions are met. These conditions include following the manufacturers label requirements and maintaining records of every agrichemical application operation.

Pilots of aircraft applying agrichemicals must hold an agricultural aircraft operator certificate and have a chemical rating available as unit standards through the NZQA framework. For example, the Open Polytechnic runs a course for the pilot's chemical rating. This covers safety with pesticides, pesticide characteristics, legislation, herbicides, insecticides and fungicides, vertebrate pesticides, equipment and calibration, and spraying techniques.

Pilots (or operators) are also required to notify aviation incidents to the Director of the Civil Aviation Authority (s 21A) if required to do so by a rule. An incident is defined as any occurrence (not being injury to a person) that is associated with the operation of the aircraft and affects the safety of operation. Agrichemical trespass is not defined as an incident in a rule.

Section 21 of the Civil Aviation Authority provides a power for the Director of the Civil Aviation Authority, with a warrant, to detain aircraft, seize aeronautical products, or impose conditions of use on an aircraft or class of aircraft.

The controls on aerial application of agrichemicals are comprehensive. In addition, the Agricultural Aviation Association has developed its own accreditation system. The system requires compliance with five codes of practice (GROWSAFE® accreditation, *Fertiliser Users Code of Practice, Code of Practice for Aerial Spreading of Poison Baits*, Codes of Practice on fuel storage and handling, training) and that its members be covered by chemical liability insurance. This particular sector must therefore look at other measures to improve performance, e.g. compulsory membership of their association, as other professionals must do, or education, or enforcement actions.

Agricultural Compounds and Veterinary Medicines Act 1997 (ACVM Act)

The HSNO legislation is designed to work in tandem with the ACVM Act. The ACVM Act's purpose is to prevent or manage risks associated with the use of agricultural compounds being risks to trade in primary produce, animal welfare, and agricultural security. They must also ensure the use of agricultural compounds does not breach domestic food standards and provide sufficient consumer information about agricultural compounds. An agricultural compound is a substance used in the direct management of plants and animals or is applied to land or water to manage plants or animals.

The ACVM Act also ensures that provided the label instructions are followed, the use of agricultural compounds will not result in breaches of domestic food residues standards (Maximum Residue Levels). It is expected that there will be a correlation between maximum residue levels and the tolerable exposure limits (TEL) set under the HSNO Act, and that if a person is applying a pesticide in a way that TELs are not exceeded, then maximum residue levels will similarly not be exceeded.

Fire Service Act 1975 (emergency management)

This Act establishes the New Zealand Fire Service and provides for its administration and funding. The Fire Service is called to emergency situations involving hazardous substances, which can be agrichemicals. To assist with management of hazardous substance emergencies the Fire Service convenes a Hazardous Substance Technical Liaison Committee (HSTLC) in each region or group of regions. The HSTLCs usually involve both regional and territorial local authorities, the public health service, OSH, ambulance and police, and sometimes industry. The HSTLCs do not have a statutory basis but are consistent with the statutory functions and powers of all these agencies.

The New Zealand Co-ordinated Incident Management System (CIMS) determines the management at an incident. HSTLCs would assist at any hazardous substance incident that requires an emergency response, including agrichemical trespass incidents. For instance, the chloropicrin incident at Kohupatiki involved members of the local HSTLC.

Accident Compensation and Rehabilitation Insurance Act 1992

The purpose of this Act is to provide an insurance-based scheme to rehabilitate and compensate in an equitable and financially affordable manner people who suffer personal injury.

The definition of personal injury appears to include injury from agrichemical exposure:

> *Section 4. Definition of "personal injury" – (1) For the purposes of this Act, "personal injury" means the death of, or physical injuries to, a person, and any mental injury suffered by that person which is an outcome of those physical injuries to that person, and has the extended meaning assigned to it by section 8(3) of this Act.*

This is currently the only means by which people suffering health effects from exposure to agrichemicals can be compensated.

Common law

Common law actions are the only legal remedy open to individuals to seek compensation for property damage from agrichemical trespass. Other avenues such as a personal approach to the applicator or through insurance are also available. Personal injury can not be compensated for as it is almost always covered under the Accident Compensation and Rehabilitation Insurance Act.

A civil case for an agrichemical trespass would involve proving a case of negligence and/or nuisance against the trespasser. For negligence it must be shown there was a duty of care owed to the affected property owner, and that the duty was breached and damage caused. Nuisance occurs where a person uses their land or carries out an activity that causes something harmful or offensive to affect a neighbour.

[For a fuller discussion of common law as it applies to agrichemicals see the text edited by DAR Williams, or for more detail on these common law torts (i.e. negligence and nuisance) see the work by Professor Stephen Todd, 2001.]

However, it is difficult to successfully prove a case in either a civil or criminal case as discussed below.

Proof

Both the civil and criminal courses of action require particular levels of proof to be established for a successful prosecution. In criminal cases this level of proof is "beyond reasonable doubt" a higher threshold than the "on the balance of probabilities" required in civil cases. This requires evidence to be gathered to establish that a "trespass" – normally some form of property damage – has occurred, and, that a particular "person" has caused the trespass. The evidence required must be of a high standard and often involves technical information. Evidence must be collected in a particular manner, which can be difficult for the lay person to achieve, and an enforcement agency or other expert often needs to be engaged.

Liability

Statutory liability (which is criminal) under the RMA and HSNO Acts is strict. There is no need to show an intention by the agrichemical applicator to cause the effect. However, in civil cases this is not the situation and the general principles of nuisance and negligence must be applied (*see* DAR Williams (ed) 1997, page 423).

The private member's Agricultural Chemical Trespass Bill aimed to resolve some of these problems by removing the requirement for proof of adverse effect. The Bill aims to provide a comprehensive legislative mechanism for the avoidance and mitigation of agrichemical trespass. The Bill makes it an offence to use agricultural chemicals (agrichemicals) in such a way as to cause an agrichemical trespass. Agricultural chemical trespass is defined as "the occurrence of any agricultural chemical of any amount such that it is detectable under any method authorised by regulations". In essence the regulations are somewhat irrelevant as the key words are "any amount that is detectable". In other words the Bill provides an offence for any level of agrichemical trespass, regardless of effect.

The absence of the requirement to prove adverse effect means that the Bill makes the pool of potentially liable persons very wide. This is even more obvious when considering that the offence is one of strict liability with no express defences of total lack of fault (that exist for the RMA regime for example – *see* section 340(2) and (3)). There are limited defences but these do not go as far as for the RMA and HSNO regimes.

The Bill also intermingles civil remedies and criminal sanctions by providing for compensation to be payable in a criminal case.

As has been stated a key problem in agrichemical trespass cases is the extent of evidence required to meet the burden of proof standards in both civil and criminal cases. However, a relaxation of the standard of proof will not occur. Therefore, there is no legislative amendment that could be effected to address the difficulty of proof; other methods need to be found. It should be noted that the use of exposure limits under the HSNO Act removes the need for complainants to prove damage has occurred. Complainants just need to show that the exposure level has been exceeded, and who caused it to be exceeded.

Conclusion

In conclusion, the legal mechanisms available to address agrichemical trespass operate at a preventative, remedial and punitive level. The difficulty in successfully proving trespass has led to relatively few prosecutions or successful civil cases. This places more importance on the preventative nature of the legislation

4 Current Management and Practice

There are several aspects to the management of agrichemicals that address trespass issues. These include a range of best practice and quality assurance programmes, and technical developments that deal with agrichemical use, which include the aim to avoid trespass. There are also a number of response protocols that deal with trespass incidents. Some of these are described below.

These initiatives do not cover all sectors or stakeholders and may not always be consistently applied. There is room for more development for specific sectors.

Management of agrichemical use

NZS 8409:1999

The *NZS 8409:1999 Code of Practice for the Management of Agrichemicals* is the main guide for New Zealanders on the application of agrichemicals and is referred to widely.

The New Zealand Agrichemical Education Trust developed the *GROWSAFE® Agrichemical Users' Code of Practice* in 1991 as a guide for agrichemical use in the agriculture sector. This was later developed into a New Zealand Standard. The New Zealand Agrichemical Education Trust consists of a wide range of constituent organisations including Agcarm Incorporated (the New Zealand Association for Animal Health and Crop Protection) and primary producer associations.

The GROWSAFE® code specifically deals with avoiding spray drift, and the notification of affected persons of agrichemical applications. It also covers the broad range of topics necessary for safe management and handling of agrichemicals including legislation, need for agrichemicals, transportation, storage, use, disposal, emergency and health and safety matters.

The associated GROWSAFE® programme (based on the NZS 8409:1999) provides different levels of training across three groups: distributors, contract users (including veterinary use, and ground and aerial applicators), and farmers/growers.

For distributors and farmers/growers the first step in training is completion of the introductory course, followed by completion of advanced training for an applied certificate. This lasts five years and can be renewed on completion of a refresher course.

For contractors, the Registered Chemical Applicators Certificate is specific to the type of applications, e.g. aerial, ground or veterinarian. A National Certificate in Agrichemical Application and 200 hours' experience is a prerequisite for aerial and ground based applications. This registration has a three-year life before refresher courses are required.

Currently only aerial agrichemical applicators are legally required to have any formal training. Some regional plans require ground-based applicators to have a degree of training.

Accreditation programmes are available to companies through the New Zealand Agricultural Aviation Association for aerial operations, and through the NZCIC Premises Inspection and Certification programme (PRINCE®) for distributors. These require operators to undergo appropriate GROWSAFE® training.

Specific users/sectors

Of the large number of users of agrichemicals, some are subject to much greater levels of regulation and industry control than others. For example, aerial operators must meet Civil Aviation Act requirements, while domestic users are subject to virtually no control (except general requirements in some regional plans). Many industry groups have developed best practice guidelines to assist with the safe use of agrichemicals that may help avoid agrichemical trespass. Examples from different sectors include:

Horticulture

The kiwifruit sector has developed the compulsory KiwiGreen for export fruit. It is an integrated pest management (IPM) based programme that became an industry standard in 1995.

Arable

The Foundation for Arable Research has a Pesticide Residue Reduction Strategy for use in the farming of wheat crops.

Organic

BIO-GRO® New Zealand provides a certification process for primary producers that requires operators to demonstrate they have reached certain standards of organic production. This is verified by documentation and audit. About 5–10 percent of the New Zealand kiwifruit and pip fruit industry have BIO-GRO® certification.

Forestry

The Forestry Stewardship Council is an international organisation promoting environmentally appropriate management of the world's forests. They accredit certification bodies that support their core set of principles and criteria for forest management. Fletcher Challenge Forests Health, Safety and Environment Management System is aligned with Forest Stewardship Council certification requirements.

Pastoral

There are few programmes in this sector. The dairy industry Market Focused is an environmental management system with provisions for responsible chemical use. Fonterra recently implemented the system.

Processors

Some processing companies run quality assurance programmes that require particular standards to be met in growing crops or animals, and pay a premium for those products. For example Heinz Watties suppliers keep a spray diary documenting each use of an agrichemical. The diary must be submitted before the company accepts a crop. In addition, the supplier (i.e. the grower) must hold a GROWSAFE® certificate.

Contractors

Contractors are employed to apply agrichemicals across all sector groups, from fumigating houses to aerial spraying. Some contractor associations have training courses, though not all contractors belong to an association. The New Zealand Agricultural Aviation Association has an accreditation scheme for its members that incorporates the GROWSAFE® Pilot Chemical Rating. The Pest Control Association of New Zealand has a code of practice to minimise the risks of pest management in urban areas.

All these quality assurance programmes should incorporate NZS 8409:1999 aspects and training requirements.

Application technology

Application technology (combined with user skill) plays a significant part in avoiding agrichemical trespass. A successful agrichemical application is one where all the target species have been contacted with the required amount of chemical and there is no off-target drift. This is achieved by application in suitable conditions using the appropriate spray droplet size and pressure, the correct chemical formulation and application rate, and the appropriate equipment. These requirements will vary depending on the spray target – the chemical being used, and the crop, weed or insect being sprayed.

Buffer zones and live shelter belts

Buffer zones and well-developed live shelter belts provide an effective means to avoid agrichemical trespass. Buffer zones provide a "safety" margin in which agrichemicals for instance can settle without causing adverse off property effects. As one of their many uses a well-designed live shelter belt can actually trap airborne agrichemicals. Using both a buffer zone and a live shelter belt together enhances the beneficial effects.

Nelson Fruitgrowers Association has developed a code of practice for shelter belts (1996). This addresses the beneficial effects of shelter belts and the ways to deal with less desirable effects such as shading and root competition, and includes maintenance issues. The code also provides advice on the appropriate species of tree to select to suit the environment, including suitable native species.

Property spray plans

Horizons.mw (the Manawatu-Wanganui regional council) is currently revising its guide to property agrichemical spray planning – *Preparing your spray plan* (June 2000). This provides a model for property spray planning.

Specific agrichemical management

Controlled pesticides such as 1080 have additional management controls, some of which help to target application more accurately through the use of navigational positioning systems. Environment Waikato has a quality assurance programme for pest control operations, including the use of 1080. The Ministry of Health also provides model 1080 permit conditions for use by medical officers of health.

Three regional plans provide rules to control the use of 2,4-D.

Agrichemical trespass management

Complainant information

Several existing pamphlets that provide information to complainants can be used to model similar publications for use by all agencies. For example, the Ministry of Health pamphlet – *Agrichemical Spraydrift* (1999), the Environment Bay of Plenty pamphlet – *Agrichemical Spraydrift*, the Auckland Regional Council – *A guide to Agrichemical Spraydrift*.

Investigation of agrichemical trespass incidents

The Ministry of Health has established the DriftNet system (Health, 1998) to investigate agrichemical spray drift incidents. This provides a mechanism for assessing and investigating spray drift incidents and for collating the data. However, it relies on people to notify public health services of incidents.

Local authorities generally have a complaints management system to record and action complaints. Usually regional councils will action complaints. There is guidance in the *Local Government New Zealand Resource Management Enforcement Manual* (1999); Appendix 2E specifically covers investigation of agrichemical trespass incidents.

The Tasman District Council and Nelson Fruitgrowers Association have developed a novel enforcement protocol for spray drift complaints. This involves the grower representative being notified of spray drift incidents and then visiting the orchardist concerned. The incident is discussed and a solution is developed. This is communicated to the Council and the complainant.

VegFed has a northern region investigator available to their members to assist with incidents of agrichemical trespass.

5 Discussion

The committee has found that the agrichemical trespass area is generally characterised by complexity, poor and uneven availability of information, problems with enforcement and recognition of effects, and uneven application of best practice.

The committee posed itself several general questions: is the legislation adequate; are there particular chemicals responsible for trespass incidents; are there particular agrichemical applicators responsible; is there a tendency for certain application methods to be involved in trespass?

The answers to these questions are not clear or straightforward. Some of the relevant legislation is new and untried, and it will take some time to see how well it works and how well it links with other relevant legislation. Compliance with the new and existing law, and enforcement of it, is an issue. There are areas where legislative amendments can improve the situation.

As to the chemicals, applicators and applications, yes, there are certain chemicals, people and methods involved in trespass incidents but from the data available it is difficult to detect any but the most general trends. The data is primarily concerned with crop damage and therefore principally from herbicide use, yet other agrichemicals are also a cause for concern. The simple answer to the above questions is that there is no simple answer or one solution and until the data improves a variety of approaches need to be tried.

Implementation

To ensure a co-ordinated response to its recommendations the committee suggests an implementation group is set up comprising members from appropriate agencies. This group should review and report on progress annually, determine the best methods to implement recommendations, and revise work as the data improves. This group could also prove useful to co-ordinate pesticide risk reduction work.

The following discussion provides the rationale for the rest of the committee's recommendations under:

- data, reporting and monitoring
- policy and enforcement
- information, education and best practice
- research and development.

Data, reporting and monitoring

Monitoring

The committee recognises this as an important area for management of agrichemicals in general and agrichemical trespass in particular. Trends can then be identified and appropriate responses developed.

The committee found that the monitoring and data on general agrichemical use, environmental and health parameters is insufficient to provide the context for agrichemical trespass issues. Appropriate indicators need to be developed among those agencies that should be collecting this data.

The OECD has prepared a guideline on the methodology to collect pesticide use data (Thomas, 1999) and conducted a survey of approaches to the collection and use of agricultural pesticide sales data (OECD, 1999). This survey showed that 20 respondent countries (there are 29 OECD member countries) had a mandatory requirement to collect at least annual pesticide sales data.

Annual data would be required over several years before trend information becomes available. The collation of the data and development of suitable indicators needs to be co-ordinated by a national agency. Several agencies need to be involved in gathering data on current agricultural use, health effect and environmental effect information. However, the committee considers the overall coordination should be undertaken by ERMA because of its key role under the HSNO Act. ERMA has the responsibility to manage the controls on hazardous substances, monitor the extent the HSNO Act reduces adverse effects from hazardous substances, monitor enforcement activity and enquire into incidents. This makes it both the logical co-ordinator and one of the key users of the information.

The data and indicators need to be collected and developed over the next few years so that some baseline information is available. Preferably this should happen before existing hazardous substances (agrichemicals) are transferred to the new HSNO controls regime.

Incident reporting

Once an agrichemical trespass has occurred the incident needs to be reported to appropriate enforcement agencies so that some action can be taken and appropriate records kept. The committee considered all the agencies involved and concluded that reporting should be co-ordinated at a regional level by regional councils. Regional councils have a strong environmental mandate and receive most of the agrichemical trespass complaints.

This incident information then needs to be passed on to ERMA in a standardised manner so that a national picture can emerge. ERMA has already developed an incident reporting protocol with enforcement agencies, and also receives annual enforcement reports from agencies. Incidents and enforcement reporting should include agrichemical trespass. The ability of ERMA to require information needs to be appropriate to this task.

Emergency situations operate under a co-ordinated incident management system (CIMS), and can include consultation with the hazardous substances technical liaison committee (HSTLC) for the area. The committee does not intend to supplant this system but rather to improve monitoring, and management in non-emergency situations.

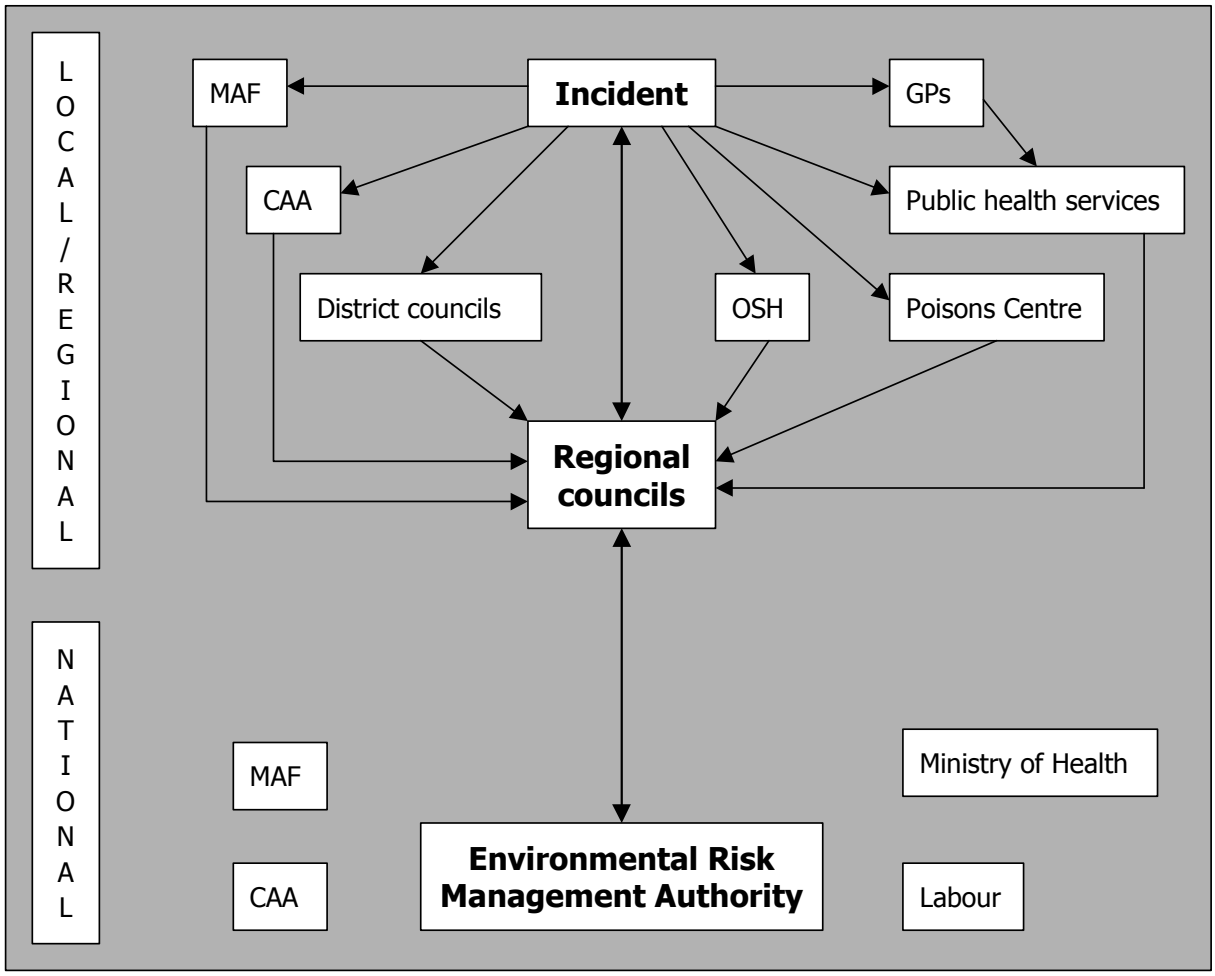
The National Poisons Centre also receives a relatively high number of calls about agrichemicals but does not appear to link to any other agency with this information. They have recently acquired an 0800 phone number, which may mean they receive even more calls. The proposed incident reporting system includes a role for the centre to inform a regional council of calls made from their region, and to encourage callers to report incidents to the regional council or public health service.

Medical practitioners need to be aware of their responsibilities in reporting suspected disease due to agrichemical exposure. The committee considers that the language used in the Acts should be reviewed so that the intention of the reporting requirement is clear. The intention in the Health Act is that illnesses **suspected** to be caused by agrichemical exposure is reported, and not, that disease must be confirmed.

The diagram below outlines the recommended reporting structure. The intention is to create a system that:

- improves information flows so that monitoring and trend information is available where it is needed, for example to adjust controls on substances. This reporting structure could work whether an emergency situation occurred or not
- ensures a co-ordinated response in non-emergency situations (i.e. where fire or police are not called).

Diagram 3: Proposed incident reporting system in New Zealand



Data

The committee encountered the problem of a lack of comparable data. A co-ordinated reporting system will require a standardised data set and collection mechanism. This should be possible to develop building on the existing systems used by the different agencies.

Industry associations can also collect national data pertinent to their particular issues and incidents. This would be useful for improving best practice and quality assurance systems.

Policy and enforcement

The committee proposes only a few legislative amendments due to the lack of detail in the data, the relative newness of the HSNO legislation, and the difficulty of improving the burden of proof requirements of law.

To enable regional councils and the National Poisons Centre to report to ERMA they need a reporting role under the HSNO Act. This could be extended for regional councils to an enforcement function, similar to territorial authorities, to broaden the pool of enforcement officers available with environmental expertise.

The ability for ERMA to require information from agencies, and even sales data from industry, should be strengthened. At present section 24 of the HSNO Act allows ERMA to request information on any incident it is investigating under section 11e, but this is not enforceable. There is no ability to gather non-incident information.

The committee sees infringement notices being useful to obtain compliance for minor agrichemical trespass incidents. These are provided for under the HSNO Act but require regulations to give them effect.

Following the incident at Kohupatiki the committee clearly sees a need for a review of the controls on fumigants in agriculture. ERMA is the appropriate agency to do this.

Adequate compensation should be available to those affected by agrichemical trespass. The committee is aware that people are not being compensated for damage or costs from agrichemical trespass because of the difficulty of proving an effect (on health or property) is attributable to specific agrichemical events. Better recognition of these effects is a key to achieve this. Compensation issues need further review.

Resource management plans, particularly regional plans, are the key existing regulatory means to control agrichemical use. While most plans address the issues to some extent there is room for improvement. The rules in the plans vary across the country for matters that would not change from region to region, e.g. notification requirements. The committee considers that some provisions should apply across the country and would benefit from being nationally consistent. This would aid users' understanding of plan requirements, assist in the preparation of best practice guides and the review of the NZS 8409:1999. The committee recommends that regional councils determine the best form for nationally consistent rules in three key areas: adequate agrichemical user training, notification, referencing of standards and codes of practice.

The committee notes the importance of NZS 8409:1999 and the reliance on correct information on labels in regional plans. *NZS 8409 Code of Practice for the Management of Agrichemicals* is the key best practice document for New Zealand. The committee supports the review of, and improvement to NZS 8409:1999.

The committee has also considered the mechanisms available to fund these recommendations, which is set out in more detail at the end of this report. The committee believes that adequate funding is necessary to implement these recommendations. The use of environmental user charges as provided for in the HSNO Act should be investigated if other funding is not adequate.

Information, education and best practices

In the absence of better data, the committee considers that providing information, education and best practices is the key to avoiding agrichemical trespass. This aspect of the committee's work links closely with the Pesticide Risk Reduction Strategy initiative.

Information needs to be available to the public and agrichemical users and disseminated widely. Information on how to complain, who to, and how to protect yourself already exists and could be the model for wider dissemination. Information on specific agrichemicals should be available at the point of sale. The National Poisons Centre is able to provide health information for specific agrichemicals and should be further publicised. The rights and responsibilities set out in regional plans needs to be more widely known. The requirements of the HSNO Act need to be widely understood.

Education of all agrichemical users is important. Even the small-scale domestic user can cause off-target problems and they should have targeted education incorporated into other programmes, such as gardening shows. All non-domestic users should have some formal education, and contractors who apply agrichemicals as a business should be well qualified. No distinction is made between aerial and ground applicators, as they should be equally well trained. Aerial operators are already required by law to hold a NZQA National Certificate in agrichemical application, and a GROWSAFE® Aerial Rating qualification, which is valid for three years. Ground operators are already able to obtain a GROWSAFE® Registered Chemical Applicator qualification but this is voluntary.

Retailers are the key provider of information to agrichemical users in many instances. Labels can only contain so much information because of their size, and material safety data sheets (MSDS) will only help more experienced users. Therefore retailers must be able to provide appropriate advice on responsible use of agrichemicals and avoiding trespass (supermarkets and some chain stores do not currently fit the description for provision of this information).

Of the many best practice guides in existence, NZS 8409:1999 is the most comprehensive and well known. The committee considers it would be useful to develop a guide specifically on how to avoid agrichemical trespass. This should use existing information and be widely disseminated.

Research and development

The committee recommends several areas where research and development should occur. These should be linked into government priorities for research. No agencies have been identified to do this work as it is expected that a competitive tendering process for research funding would be undertaken. The committee recognises that some of this work may take many years to achieve and could usefully involve collaboration with overseas research initiatives.

There are a number of areas where innovative research and development activity is occurring that can address some of the agrichemical trespass issues. Other research should be initiated.

One existing area is the development of methods to identify the causal link between the agrichemical user and the trespass, required as proof in a prosecution. For example, Crop and Food have supported work on an innovative development to create a tracer or marker that can be added to chemicals, and will identify the individual user of the chemical.

Other areas are the continued development of computer models for use in decision-making in agrichemical application (e.g. SprayCan), research into shelter belts, and the categorising of agrichemical application equipment on the basis of potential hazard.

Another area is research into the detection and treatment of humans exposed to agrichemicals and the contribution that complementary medicine can make to diagnosis and treatment. This work may link into the work of the Ministerial Advisory Committee on Complementary Medicine.

An urgent area for research attention is the practical application of HSNO controls, particularly how EELs will work on the ground.

6 Recommendations

In addition to its implementation recommendations, the committee's other recommendations are organised under the four headings of:

- data, reporting and monitoring
- policy and enforcement
- information, education and best practice
- research and development.

The committee sees these recommendations as an integrated package but recognises that not all can be implemented at once. Considering this, and using its best judgement, the committee has sorted the recommendations into classes depending on the complexity of implementation and the need for urgent short-term action or longer-term resolution. It is clear that some key recommendations need to be addressed first to enable implementation of other recommendations, e.g. legislative amendments. This prioritising is set out in the following table:

Table 8: Priority assigned to recommendations by the ATMAC

Priority	Recommendation numbers
1A – Urgent short-term and complex	2, 3, 4, 7, 8, 9, 12, 13, 14, 20, 24, 26, 28, 29, 32, 36
1B – Urgent short-term and easy	1,10, 11, 21, 27, 31
2 – Medium term	5, 6, 15, 16, 17, 18, 19, 22, 23, 25, 30, 33, 34, 35, 37, 38, 39, 40, 41

Recommendation 1 – **Implementation and review** (Priority 1B)
That an inter-agency group be formed to scope, oversee and monitor implementation of these recommendations including their annual review.

Data, Reporting and Monitoring

Monitoring

Recommendation 2 – **Monitor agrichemical trespass incidents** (Priority 1A)
That regular national monitoring of agrichemical trespass incidents occurs with ERMA co-ordination.

Recommendation 3 – **Monitor national agrichemical use** (Priority 1A)
That regular national agrichemical use data be gathered so that trends can be monitored over time.

A range of agencies will be involved in collecting trend data including Customs and the agrichemical industry for import and sales data; Ministry of Agriculture and Forestry/Agricultural Compounds and Veterinary Medicines Unit and industry for use patterns; and the Ministries for the Environment and Health to ascertain non-agricultural use patterns.

Recommendation 4 – **Monitor health effects** (Priority 1A)
That the Ministry of Health monitor and report on non-occupational health effects from agrichemical exposures, including the data collected by the National Poisons Centre, DriftNet and notifications under the Health Act, and that the OSH monitor health effects from occupational exposure to agrichemicals including the data collected by the NODS.

Recommendation 5 – **Monitor environmental effects** (Priority 2)
That the Ministry for the Environment monitor and report on the environmental levels of currently used agrichemicals in soil and water, and links these to the national agrichemical use pattern. Regional councils would assist in data collection.

Recommendation 6 – **Role of industry and user groups** (Priority 2)
That agrichemical user groups keep information on agrichemical trespass incidents and issues to assist in development of best practice, e.g. quality assurance/ environmental management systems.

Recommendation 7 – **ERMA role** (Priority 1A)
That an overview monitoring capability is developed by ERMA to monitor the data collected on New Zealand agrichemical use, agrichemical environmental levels, health effects, and agrichemical trespass incidents. Together with enforcement activity reports, this information can be used to assess the effectiveness of controls on agrichemicals.

Protocols of what should be monitored should be agreed between monitoring agencies involved in collecting data. This information should then be fed-back to enforcement agencies and information providers, and can be used to tailor appropriate controls on agrichemicals. ERMA should publicly report this information annually.

Reporting

Recommendation 8 – **Reporting incidents** (Priority 1A)
That clear lines of reporting agrichemical trespass incidents are developed and coordination among key agencies occurs. Enforcement agencies should co-ordinate this with ERMA.

Recommendation 9 – **Regional co-ordination** (Priority 1A)
That regional councils be the key regional co-ordinating agency (e.g. to pass information on to the appropriate enforcement agency, and all agencies notify regional councils of reported incidents).

Recommendation 10 – **Investigate under-reporting** (Priority 1B)
That the Ministry of Health investigates the reasons for under-reporting by medical practitioners under the Health Act, of health effects suspected to be from agrichemical exposure.

Recommendation 11 – **Use existing reporting systems** (Priority 1B)
That all agencies improve and promote use of their existing reporting systems to ensure agrichemical trespass incidents are recorded, e.g. OSH and NODS, Health and DriftNet, and ERMA and HSNO Act reporting.

Data

Recommendation 12 – **Incident recording and reporting system** (Priority 1A)
That a standardised system of recording and reporting incidents for all involved agencies be developed, e.g. National Poisons Centre, regional councils, district councils, industry groups, Public Health Services, ACVM unit, and OSH.

Recommendation 13 – **Standard data gathered** (Priority 1A)
That a standard data set should be gathered by all enforcement agencies involved. ERMA should co-ordinate the data requirements. Consideration should be given to include as a minimum:

- what the substance was – from the product label
- who the applicator was
- what the application method was
- what effect is being experienced (health, property, other environmental effect)
- what date/time application occurred and what the weather was like
- what evidence was gathered.

Policy and enforcement

Recommendation 14 – **HSNO Act amendment** (Priority 1A)

That the HSNO Act be amended:

- to provide a monitoring role to ensure better linkage with ERMA for:
  - regional councils
  - the National Poisons Centre,
- to provide an enforcement function for regional councils, similar to territorial authorities' ability to enforce HSNO while undertaking RMA enforcement
- to provide better linkages for ERMA to require information from agencies and industry.

Recommendation 15 – **Fumigation** (Priority 2)
That ERMA review the adequacy of controls on fumigants in agriculture.

Recommendation 16 – **Infringement offences** (Priority 2)
That regulations be developed to enable infringement offences under the HSNO Act for minor agrichemical trespass actions where no significant damages or injury occurs.

Recommendation 17 – **Adequate resourcing** (Priority 2)
That the capacity of agencies to supply information and to enforce legislation is adequately funded. This should include work by the Ministry for the Environment to investigate the use of an environmental user charge on agrichemicals, under the HSNO Act, to fund monitoring, reporting and research activity.

Recommendation 18 – **Compensation** (Priority 2)

That compensation should be available to those affected by agrichemical trespass:

- a review of ACC compensation for personal injury in this area should be undertaken
- a review of the adequacy of compensation for property damage through insurance and the civil courts is undertaken.

Resource management plans

Recommendation 19 – **Develop land use provisions** (Priority 2)
That land use provisions in district plans be refined further to avoid, remedy and mitigate agrichemical trespass. Stakeholder groups together with the Planning Institute, district councils and Ministry for the Environment should explore options to address conflicting land uses.

Recommendation 20 – **Consistent approach in regional plans** (Priority 1A)

That the regional council resource managers group develop nationally consistent guidelines for the conditions on use of agrichemicals in regional plans, in particular for:

- adequate agrichemical user training
- notification
- referencing of national standards and codes of practice in plans, e.g. GROWSAFE® NZS 8409:1999.

Information, education and best practices

Recommendation 21 – **Complainant information** (Priority 1B)
That HSNO enforcement agencies and regional councils provide complainants with information to enable them to effectively report incidents, to take steps to safeguard themselves, and to collect evidence. This information should build on existing material and standard procedures. The information should also include the importance of reporting incidents so that agencies gain better information.

Education

Recommendation 22 – **Domestic use of agrichemicals** (Priority 2)

That:

- point of sale information on preventing agrichemical trespass is provided at retail outlets
- domestic users be educated through broader focused gardening programmes and courses about the safe use of agrichemicals and how to avoid trespass (TV, radio, community education courses). The NZ Agrichemical Education Trust and Agcarm Inc are appropriate leaders for this
- domestic users are aware of their obligations under their regional plans

- the recently installed 0800 number for the National Poisons Centre be promoted to allow easier access to health information
- regional councils promote the availability of their environmental "hot line".

Recommendation 23 – **Retail sale of agrichemicals** (Priority 2)

That the sale of agrichemicals should reflect the importance of safe use and the potential for adverse effects. Retail outlets should be required by HSNO controls to only be able to sell agrichemicals (as defined in the terms of reference) if they can provide informed advice on preventing agrichemical trespass at point of sale.

- At retail outlets at least one person on site should have full GROWSAFE® or equivalent training and all others selling agrichemicals should have a minimum of basic-level training.

Recommendation 24 – **Training requirements** (Priority 1A)

That all users should be required to use agrichemicals with care. Users of larger amounts of agrichemical (i.e. greater than domestic use) should have some formal training.

- Contractors (those who apply agrichemicals as their business), both ground and aerial based individual users must have comprehensive training, e.g. GROWSAFE® registered chemical applicators certificate.
- All other non-domestic users should have elementary training as a minimum, e.g. the GROWSAFE® introductory course or equivalent.
- That industry groups ensure that training occurs, e.g. Federated Farmers.
- That industry quality assurance programmes should require suppliers to be appropriately trained.
- That people using contractors to apply agrichemicals ensure the contract document stipulates an appropriate level of training.
- That regional plans include these training requirements.
- That HSNO controls require appropriate levels of training for agrichemical users.
- That the NZ Agrichemical Education Trust consider removal of registration from a contractor if significant non-compliance with NZS 8409:1999 occurs.
- That the CAA consider removal of the rating from an aerial contractor if significant non-compliance with NZS 8409:1999 occurs.

Recommendation 25 – **Medical practitioners training** (Priority 2)
That the Ministry of Health ensures medical practitioner training (both initial and ongoing) includes modules on identification and treatment of illness associated with agrichemical exposure.

Recommendation 26 – **Practical HSNO regime education** (Priority 1A)
That ERMA and Ministry for the Environment ensure that HSNO education will address practical aspects of hazardous substance management for user groups. This should include the implications of the legislation for agrichemical use and, practically, how to comply with the legislation with respect to TELs and EELs. This should include the cumulative effects from multiple users.

Recommendation 27 – **Education on regional plans** (Priority 1B)
That regional councils continue to provide education to users and the general public on the provisions in their regional plans for the management of agrichemicals. This should include the relationship between the RMA and the HSNO Act. This could be incorporated into other programmes to ensure users see it as relevant.

Best practices

Recommendation 28 – **GROWSAFE® code NZS8409** (Priority 1A)

- That the government continues to support with funding the ongoing development of the GROWSAFE® code NZS 8409:1999 as the key performance standard and user guide to agrichemical use in New Zealand.
- That the GROWSAFE® Code be reviewed to make it an Approved Code under the HSNO Act 1996 and the ACVM Act 1997.

Recommendation 29 – **Industry specific training** (Priority 1A)
That funding and technical support is given by the appropriate industry group to develop industry specific GROWSAFE® training programmes (or equivalent) for agrichemical use, in particular for pastoral farmers, and road and rail verge applicators.

Recommendation 30 – **Specific agrichemicals** (Priority 2)
That ERMA ensure controls are appropriate to the risks of agrichemical trespass identified with specific agrichemicals.

Recommendation 31 – **Quality planning** (Priority 1B)
That the examples of land-use plan provisions researched for this report by Harrison Grierson be included in the Quality Planning website by the Ministry for the Environment.

Recommendation 32 – **Best Practice Guides** (Priority 1A)
That government funds the development and publicity of a best practice guide showing the key factors in avoiding agrichemical trespass (Appendix 9 shows some examples of what should be included).

Research and development

The committee anticipates the government will include the following recommendations in the priority lists for research funding.

Human health related research

Recommendation 33 – **Detection procedures for humans** (Priority 2)
That research is undertaken into techniques of diagnosis and treatment of health effects resulting from agrichemical exposure that can be used in New Zealand.

Recommendation 34 – **Complementary medicine techniques** (Priority 2)
That research is undertaken into complementary medicine techniques for the diagnosis and treatment of people exposed to agrichemicals that can be used in New Zealand.

Recommendation 35 – **Refinement of the TEL** (Priority 2)

That research is undertaken to ensure TELs incorporate:

- exposure at physiologically vulnerable times (e.g. early foetal life)
- very low level exposure
- the effect of combinations of chemicals.

Environmental effects

Recommendation 36 – **Practical compliance with an EEL** (Priority 1A)
That research is undertaken to determine how practical compliance with an EEL can be achieved.

Recommendation 37 – **Development of unique chemical tracers** (Priority 2)
That research is supported into the development of unique tracers to identify agrichemical users. Consultation should occur with agrichemical users prior to use of such tracers.

Recommendation 38 – **Computer modelling for spray drift management** (Priority 2)
That computer modelling systems be developed for facilitating effective decision-making at the time of spraying (i.e. real time models).

Recommendation 39 – **Shelter belt research** (Priority 2)

That research is undertaken into suitable live shelter belts to:

- determine the qualities and characteristics of effective shelter belts.
- identify suitable native and exotic species
- collate existing and new data and produce a practical guide.

Recommendation 40 – **Volatilisation under New Zealand conditions** (Priority 2)
That research is undertaken into the role of volatilisation in New Zealand agrichemical spray drift situations.

Recommendation 41 – **Application equipment** (Priority 2)
That a practical method be developed for categorising agrichemical application equipment on the basis of potential spray drift hazard.

7 Funding Options for Actions to Address Agrichemical Trespass

An appropriate funding mechanism should take account of the action to be taken, the agency or person responsible for taking the action, and checking that there are good ways for an agency or person to be held accountable for the use of the funding. The following provide examples of options that can be considered.

Table 9: Funding options and agencies

Action	Agency responsible	Funding options	Accountability
Legislative change	MfE	Vote Environment	Public Finance Act
More compliance checking and enforcement	HSNO Enforcement agencies – central government	Enforcement agency votes – Health	Public Finance Act
	Regional councils (RMA enforcement)	Rates Administrative charge s 36(1)(c) and for duties under s 35(2)(a)	Rating Powers and Local Government Acts Local Government Act 716A or 716B
Research into compliance checking	Crown Research Institutes	FRST funding	Contract rules
More advice on best practice	ERMA Industry – NZAET	Vote Environment Industry levies Sustainable Farming Fund Sustainable Management Fund (Vote Environment)	Public Finance Act Association rules Contract rules
User training	Industry training organisations and other training providers	Course fees	User pays and competition
Monitoring	ERMA MfE Health MAF CRIs	Vote Environment Vote Health Vote Agriculture FRST	Public Finance Act Contract rules

A possible mechanism outside of this framework of usual funding sources is the HSNO Act provision for environmental user charges (EUC) (s 96). The EUC is intended to complement controls on hazardous substances by adding a charge to the product price which creates an incentive to use less or switch to less hazardous alternatives. It is therefore a tax paid by users when they purchase the product. It is not to be developed as a funding source per se, but experience with such product charges is that their acceptability is increased where the revenue collected from the EUC is directed at measures to assist those paying the charge to find and adopt workable alternatives.

Section 96 requires the Authority to report to the Minister on any proposal for an EUC and sets out the provisions to be covered. To implement an EUC the Minister has to gain agreement from Parliament through an Appropriation Bill (as is required for any tax proposal).

Bibliography

Auckland Regional Council. *A guide to Agrichemical Spraydrift* (pamphlet).

Bates MN, Hannah DJ, Buckland SJ, Taucher JA, van Maanen T. 1994. Chlorinated organic contaminants in breast milk of New Zealand women. *Environmental Health Perspectives Supplements* 102(Suppl 1): 211–7.

Bates M. 1999. *Annual Report to the Ministry of Health on agrichemical spray drift incidents reported to New Zealand public health units during 1998*. ESR, March.

Close ME. 1996. Survey of pesticides in New Zealand ground waters 1994. *NZ Journal of Marine and Freshwater Research* 30: 455–61.

Close ME, Rosen MR. 2001. 1998/99 national survey of pesticides in groundwater using GCMS and ELISA. *NZ Journal of Marine and Freshwater Research* 35: 205–19.

Environment B-O-P. *Agrichemical Spraydrift: Reducing risks and taking action* (pamphlet). Bay of Plenty Regional Council.

Evening Post, 22 December 2001 – 1st edition. Upper Hutt family's dog killed by 1080.

Fowles J, Mazzoni S, Bates M, Thornley C, Galloway Y. 2001. The surveillance of agrichemical spraydrift incidents in New Zealand, 1998–2000. *NZ Public Health Report* 8(4) April.

Galloway Y. 2000. *Report on Agrichemical Spray Drift Incidents Reported to Public Health Services, 1999*. ESR, March.

Holland P, Rahman A. 1999. *Review of Trends in Agricultural Pesticides Use in New Zealand*, MAF Policy Technical Paper 99/11
http://www.maf.govt.nz/mafnet/publications/pestrend/pestrends-01.htm#P126_1624

Horizons.mw. 2000. *Preparing your property spray plan* (pamphlet). Manawatu-Wanganui Regional Council, June.

Lee B, Close M, Aislabie J, Magesan G, Bekesi G. 2001. *The Pesticide Study at Himatangi*. Manaaki Whenua Landcare Research.

Local Government NZ. 2001. *Local Government Resource Management Enforcement Manual,* http://www.lgnz.co.nz/bookshelf/bestpractice/rmem/

Mazzoni S. 2001. *Report on Agrichemical Spray Drift Incidents Reported to Public Health Services, 2000*. ESR, March.

Meenken D. 1994. *Effects on Water Quality of an Aerial 1080 Possum Poisoning Operation, Wairarapa, June 1993*. Wairarapa Report 94/1, Wellington Regional Council.

Meenken D, Johnson B, Eason C. 2000. *Effects on Water Quality of a 1080 Possum Poisoning Operation by Manual Bait Application*. Wairarapa Division Report 00/1, Wellington Regional Council, February.

Ministry for the Environment – Manatu Mo te Taiao. 1989. *Pesticides: Issues and Options for New Zealand.*

Ministry for the Environment – Manatu Mo te Taiao. 1997. *The State of New Zealand's Environment*. Groundwater: 16.

Ministry for the Environment – Manatu Mo te Taiao. 1999. *Reporting on Persistent Organochlorines in New Zealand*.

Ministry of Health. 1995. *Model Permit Conditions for the Use of Sodium Monofluoroacetate.*

Ministry of Health. 1998. *The Investigation and Surveillance of Agrichemical Spraydrift Incidents: Guidelines for public health services.*

Ministry of Health. 1999. *Agrichemical Spraydrift: Reducing risks and taking action* (pamphlet).

Myers DN, Thomas MA, Frey JW, Rheaume SJ, Button DT. 2000. Water quality in the Lake Erie-Lake Saint Clair drainages. *US Geological Survey Circular* 1203.

Nelson Fruitgrowers Association. 1996. *Code of Practice for Shelter Belts*. January.

OECD. *OECD Survey on the Collection and Use of Agricultural Pesticides Sales Data: Survey results*. OECD ENV/JM/MONO(99)1. OECD Series on Pesticides No 7.

Organic NZ. 2001. Fighting spray drift ... and winning. July/August, p.33.

Parliamentary Commissioner for the Environment. 1993. *Management of Agrichemical Spray Drift*.

Parliamentary Commissioner for the Environment. 1994. *Possum Management in New Zealand.*

Rosen MR, Cameron SG, Reeves RR. 2001. *Determination of Non-point Source Chemical Ground Water Quality Indicators for NZ Aquifers*. GNS.

Smith N, Temple W. 1998. Pet poisonings. *Australian Pharmacist* 17(1).

Spurr EB, Powlesland RG. 1997. Impacts of aerial application of 1080 on non-target native fauna – review and priorities for research. *Science for Conservation* 62, Department of Conservation – Te Papa Atawhai.

Standards NZ. 1999. *Code of Practice for the Management of Agrichemicals NZS 8409:1999.*

Thomas MR. 1999. *Guidelines for the Collection of Pesticide Usage Statistics within Agriculture and Horticulture*. Paris: OECD.

Todd S (ed). 2001. *The Laws of Torts in New Zealand* (3rd edition). Wellington: Brookers.

Wilcock RJ. 1989. Patterns of pesticide use in New Zealand: Part 1: North Island 1985–1988. *Water Quality Centre Publication No 15*. DSIR.

Williams DAR (ed). 1997. *Environmental and Resource Management Law* (2nd edition). Butterworths.

World Health Organization. 1998. *Results of Analytical Field Studies on Levels of PCBs, PCDDs, and PCDFs in Human Milk*, http://whqlibdoc.who.int/euro/-1993/ICP_CEH_541_F.pdf (November 2001).

Appendix 1: Committee Member Information

Chair:

Bob Priest	Deputy Chief Executive, Environment Waikato

Members:

Helen Atkins	Lawyer, Philips Fox
Alan Cliffe	Agrichemical producer
Francesca Kelly	Public health expert
Richard Kempthorne	Fruit grower
John Maber	Technical expert and educator
Graham McBride	Farmer
Audrey Severinsen	Mayor Manawatu District, farmer (early part of project)
Percy Tipene	Organic farmer, Maori perspective
Meriel Watts	Public interest group – Soil and Health Association, Chemical Trespass Coalition

Appendix 2: Terms of Reference

1) The Advisory Committee shall:

   i) identify the nature and extent of problems associated with risks arising from off-target exposure to agrichemicals, i.e. the use of agrichemicals resulting in their being deposited other than on the intended target area. The risks to be addressed shall include those to human health, the environment and property such as crops, livestock etc

   ii) where possible, reach a consensus and report to the Minister for the Environment with practical and workable solutions that are immediately available to address any specific problems associated with risks arising from the use of agrichemicals and which can be addressed using existing law (including laws already passed by Parliament, regulations and similar instruments already in place or approved for introduction) or practices in common use

   iii) if practical and workable solutions do not appear to be immediately available under existing law or practice, report to the Minister on those areas and identify what further steps are required to enable practical and workable solutions.

   In each case the Committee's report(s) will take into account the matters described below.

2) The Advisory Committee Report to the Minister shall examine all of the concerns about agrichemicals use and:

   i) develop a common understanding of and describe the nature and scope of the agrichemicals use that the Committee considers is adversely affecting human health, the environment and property, particularly the:
      a) specific agrichemical types
      b) specific methods of use of the agrichemicals
      c) locations where agrichemicals are used in relation to surrounding land uses

   ii) develop a common understanding of and describe the nature and extent of the adverse effects caused, including the nature and extent of:
      a) human health effects
      b) effects on the environment
      c) effects on property including crops, livestock etc

   iii) identify, fully describe and evaluate options for reducing the adverse effects identified. The evaluation shall include:
      a) the projected health, environmental, economic and social consequences of the option

   iv) the workability and practicality of the option proposed including, where the solutions proposed are not immediately available, the steps required to provide those solutions

v) any consequences in respect of New Zealand's present system of legal rights (e.g. including but not limited to consideration of the Bill of Rights Act, the principles of the Treaty of Waitangi, Privacy law, and legal practice with respect to the burden of proof)

vi) where justified, recommend new policies, including, if considered necessary, new legislation, amendment to existing legislation and/or changes in practice, that would attend to these concerns. Such recommendations should be consistent with the principles and objectives of the Hazardous Substances and New Organisms Act and Resource Management Act.

3) The report shall take into account the:

i) Hazardous Substances and New Organisms legislation, and in particular the regulations and controls to be available to manage the adverse effects on people, the environment or communities due to substances that may be hazardous to people (toxic) or to the environment (ecotoxic)

ii) resource management legislation, and in particular the controls available to regional councils and territorial local authorities when the HSNO Act is commenced for hazardous substances

iii) (if available) the report on best practices in pesticides reduction being prepared as part of the Pesticides Reduction Strategy work programme.

4) The provision of legal aid or alternatives to pesticide use are not part of the scope of this review.

5) In preparing its reports the Advisory Committee shall liaise with the relevant sections in the Ministry for the Environment.

6) The Advisory Committee shall present an interim report to the Minister for the Environment within four months of being appointed which identifies:

i) those areas or matters where solutions are immediately available

ii) those areas or matters where further work is required to enable practical and workable solutions to be achieved.

7) The Advisory Committee shall present its final report to the Minister for the Environment within eight months of being appointed.

8) For the purposes of this report agrichemical means any substance manufactured for the purpose of causing mortality, inhibited growth, or inhibited reproduction in an organism. The terms substance, manufacture and organism have the same meaning as given in the Hazardous Substances and New Organisms Act 1996.

Appendix 3: A Brief History of Agricultural Chemical Trespass/ Spray Drift Work in New Zealand

1984	*Report on the Use of Agricultural Chemicals in the vicinity of Henderson Valley Primary School, Auckland* Department of Health
1985	*Report on Herbicide Damage*, to Minister of Agriculture Working party on herbicide damage
1985–86	*Te Horo School Pesticide Study* Department of Health
1986	Task Force on chronic agricultural chemical poisoning notifications Report to Director General of Health, Dr T Maling
May 1989	Pesticides: Issues and Options for NZ Ministry for the Environment
January 1990	Pesticides Technical Task Group – reported to Minister
July 1990	*Public perception of risk from chemicals* Department of Health survey
1990	Joint Primary Industry Working Party on Agrichemicals established (by VegFed)
April 1991	*Report of Illness in Sunnyvale, Waitakere City* Auckland Area Health Board
July 1991	Resource Management Act
5 May 1992	New Zealand Agrichemical Education Trust (NZAET) formally established by signing the Trust Deed (VegFed, NZFF, Fed Farmers, Forest Owners, Kiwifruit, Grape Growers and later Rural Contractors and NZAAA for Ag Aviation Section)
1992	First edition of *GROWSAFE® Code of Practice for Agrichemicals* published by NZAET (primarily for ENZA's use)
December 1993	*Management of agrichemical spray drift* Parliamentary Commissioner for the Environment
May 1994	*Possum Management in NZ* Parliamentary Commissioner for the Environment
May 1994	Hazardous substances: the Public Health Commission's advice to the Minister of Health
November 1994	*Agrichemical Spray Drift Management* Pesticides Board
1995	Formation of the Chemical Trespass Coalition

1995	New GROWSAFE® edition as NZ Standard 8409:1995
1995	First GROWSAFE® course completed
December 1996	*Pesticides: The cost, issues and trends in NZ territorial local authorities* David McGarrigle
June 1996	Hazardous Substances and New Organisms Act
November 1997	Agricultural Compounds and Veterinary Medicines Act
1997	Introduction of the Agricultural Chemical Trespass Bill by Labour MP Jill White
June 1998	*The Investigation and Surveillance of Agrichemical Spraydrift Incidents – Guidelines for Public Health Services* Ministry of Health
October 1999	*Review of Trends in Agricultural Pesticides Use in New Zealand* MAF Policy Technical Paper 99/11
1999	New edition of *GROWSAFE® Code of Practice for the Management of Agrichemicals as NZ Standard 8409:1999*
October 2000	*Caught in the Headlights: New Zealanders reflections on possums, control options and genetic engineering* Parliamentary Commissioner for the Environment
May 2001–March 2002	Agrichemical Trespass Ministerial Advisory Committee

Appendix 4: Presentation by Dr Ricky Gorringe, 12 July 2001

Dr Gorringe became interested in this area after suffering a chemical exposure himself. His house had tannalised timber on the internal walls that resulted in his whole family suffering from ME due to arsenate poisoning. This took several years to establish during which time he met Dr Mat Tizard who diagnosed it using Voll technology. This diagnosis resulted in a cure for the whole family, after many years of fruitless and wrong diagnosis elsewhere. Dr Gorringe was already working as a GP.

His key concern is to see agrichemical use made safer and, where possible, reduced (USA fruit and vegetable residues are less than one quarter of New Zealand foods).

GP training and approach

The New Zealand medical establishment has no position on training, recognising or treating chemical poisoning, let alone complementary medicine diagnosis and treatment with appropriate therapies of homeopathy, detoxification and enzyme system support. Complementary practitioners are often the last in line to be consulted.

Canada and the UK take an integrated approach to allopathic and complementary medicine practice. In 1986, after several years of losing up to 10 percent of patients to complementary practitioners such as naturopaths, chiropractors, osteopaths and homeopaths, the British Medical Association (BMA) changed its stance on complementary medicine. In a complete turn around, it published the official policy change in the book *Complementary Medicine – New Approaches to Good Practice* BMA, OUP 1993.

New Zealand GPs see most of the patients with chemical sensitivities, rather than consultants. Dr Gorringe estimated that of the 7000 patient contacts a year seen by GPs only seven patients were referred to hospital per year = 0.01 percent consultant contact.

In general, the approach by mainstream New Zealand doctors, including hospitals and consultants, is to treat the symptoms of chemical poisoning rather than look for and identify the chemical and use appropriate detoxification treatment. Using the "Law of Parsimony" GPs look for only one cause and rarely consider chemical poisoning. There needs to be the probability of chemical poisoning in the medical paradigm so that it is then investigated. GPs are not trained to consider this possibility, and have even less knowledge of possible treatments.

Medical practitioners need training in chemical poisoning recognition, diagnosis and treatment – both GP and hospital consultants.

Symptom patterns of chemical sensitivity

Sensitivity can occur at any time after an individual has been exposed to agrichemicals and may take years of exposure to develop. It does not occur in all people. It can be seasonal and some people seem to be more susceptible to it. It is estimated that 1:10 to 1:12 people become sensitive. For instance, the peak of the 'Roundup season' is in August and September when 2–3 patients per day are seen at Dr Gorringe's clinic. There are seven formulations of glyphosate, the active ingredient in Roundup and similar preparations, each with their unique differences in symptom presentation. This variation is mostly due to the different surfactants. Some formulations are more problematic than others, but there is no work being done to assess the effects of different additives (e.g. surfactant) on the active ingredients. For example, the G2 Roundup surfactant produces fewer headaches in susceptible people than the R360 Roundup.

Case examples of people suffering chemical sensitivity:

1 A 'townie' who experienced numerous symptoms of chemical sensitivity, received over $100,000 of treatments from ACC, physio, hospital admissions and operations. When she visited Dr Gorringe he diagnosed chemical sensitivity at 5ppb of Silvex and successfully treated her.

   Silvex is a biotransformation product that can be detected in urine and occurs when phenoxy herbicides (e.g. 2,4-D and 2,4,5-T) are transformed in the liver. Vietnam veterans were exposed to mixtures of these chemicals and often have Silvex present only on urine testing.

2 A farmer suffered from an anaphylactic problem that required adrenaline treatment. After suffering several of these it was found that he had 5ppb Silvex from 2,4-D and 2,4,5-T exposure. He was successfully treated.

3 A 'townie' moved onto an urban property that had willows and blackberry. She suffered fatigue, muscle pain, sore neck, retro-orbital pain, and headache. It was found that unknown to her, her husband had sprayed the gorse and willow stumps, next to the vegetable garden using a mixture of 2,4,5-T, Tordon and other chemicals. Her 2,4-D levels were off the scale.

4 A Vietnam veteran presented with heart problems, 'psoriasis', which uncharacteristically got worse in sunlight, and had been off-work for some time. His 2,4,5-T levels were off the scale. He was successfully treated.

5 In Cambridge it was noticed that there was a three-monthly cluster of patients associated with a school seeking treatment for headaches. The clusters coincided with a spraying programme. This could be solved by not spraying when children are at school, allowing time for chemical translocation in to the weeds/grass, or if a playing field is sprayed, as for Onehunga weed, then the area should be done say late Friday and encircled with plastic tape (like police mark off a crime scene). Prior to spraying children could be notified via notices in class and a warning notice should be left in place over the weekend.

6 Notices could be put on paths and access ways in public areas, e.g. local rose gardens, playing fields and school grounds (Hamilton City do this already – a yellow sandwich board "Danger, spraying in progress).

There are recognisable symptom patterns for agrichemical poisoning. They often relate to changes that occur in the autonomic nervous system, skin and connective tissue (muscle, ligaments and tendons).

Children present in particular ways because of their small body fat stores (4–5 percent). Most chemicals that cannot be immediately processed are stored in the high-fat content glial brain cells. For instance after international air flights children can often exhibit brain and autonomic nervous system symptoms – out of character behaviour such as wet beds, decreased short term memory, learning difficulties, sleep disturbance, irritability, irascibility, crying a lot, fighting easily, etc. This is attributed to D-phenothrin and other synthetic pyrethroids sprayed in aeroplanes on international flights to combat insects.

Fatigue is a dominant symptom. Fatiguability is abnormal. GPs have a standard range of tests for this that doesn't include chemical exposure. There are alterations to brain function, cardiovascular, respiratory, and gastro-intestinal systems. There are changes of affect and mood, for example phenoxy herbicides are associated with increasing quietness and withdrawal, and a decrease in motivation.

Tests for chemical sensitivities

Only about one quarter of chemicals used in New Zealand can be measured by tests on blood and urine that are readily available in New Zealand. To test for 2,4,5-T costs $150 at ESR or $US340 in the USA (and there are export restrictions on body fluid samples that must be met). There is no blood or urine assay for glyphosate or paraquat. Paraquat is bound to fat and is not detectable in blood or urine and has to be assayed in fat in ppb, which is not available in New Zealand. Paraquat is also easily absorbable through skin.

Patients can't get these tests done by GPs. Cost cutting has resulted in minimal testing, a "medicine-to-the-dollar" approach. [This has also had an impact on testing for some infectious diseases where patients aren't tested to see what infection they have unless for a specific end-result. Therefore there is a lack of precision in information on what infectious diseases are currently present, e.g. viruses other than E-Be, CMV, mycoplasmos, fusiformis, necrophorms, clamydia psitticoie].

There are alternative tests available such as the Vega test machine, Peak Muscle Resistance Testing with Vega test vials and Volls testing using acupuncture points. These straightforward tests can be performed by skilled practitioners during a clinic visit, and their results provide a strong pointer in terms of probability as to what may be present. The results may be able to be confirmed with standard analysis, having given a clue as to where to spend further investigative money. If no other tests are available, the tests can stand alone as the highest probability on which to base some rational therapy according to the classical picture of history, signs and symptoms, blood and urine tests etc, without lapsing backward into symptom treatment.

Proposals to address chemical sensitivities

- Diagnostic modalities (Vega, Volls, PMRT) and treatment modalities (mainly homeopathy, herbs, minerals and vitamins) are available but are currently ignored by mainstream medicine. They need to be co-ordinated and disseminated by people already familiar with their use.
- Medical costs for treatment of chemical sensitivity should be paid for like drug treatments as, in general, no drugs will detoxify chemicals.
- Land-use planning controls need to be used more to ensure compatibility of uses and safety of adjoining people. For instance designating areas of high spray use as horticultural land (like an industrial area) and not for residential use. Models of this exist in Europe.
- There is a need for a "safe neighbour policy", contacting neighbours prior to agrichemical use by, for example, an e-mail list automatically sent to people likely to be in contact with the spray drift. This can be confirmed on the appropriate morning the weather is suitable.

Appendix 5: Data

Data from Spray Drift Damage Reports
Vegetable and Potato Growers Federation (JM Becroft, advisor)

	Date	Crop affected	Location	Agrichemical	Use method	Applicator	Used for	Damage
1	3/11/98 Incident	Cucumbers	Glasshouse 7000m^2	Stomp Atrazine Roustabout	Vehicle mounted boom	Contractor	Maize crop for pigs	Burning young plants and ornamentals
2	7/7/99	Tomatoes	Redpath twinskin 546m^2	MCPB	Boom on tractor	Farmer	?	Notified but wind changed/ strengthened Cultural problems Made a private settlement
3	14/7/99 Incident	Tomatoes	Glasshouse 6000m^2	Phenoxy – Pasture Kleen (2-4D Amine)	Vehicle mounted boom	Contractor	Pasture weeds	?
4	23/7/99 Inspection	Tomatoes	Glasshouse 2000m^2	?Phenoxy	?	?	?	Leaf-edge burn, tops distorted Cultural problem
5	22/7/99 Inspection	Tomatoes	Wood/glass house 1450m^2	?Phenoxy	?	?	?	? Cultural problem
6	5/7/99 Inspection	Tomatoes	Glasshouse 2000m^2	?Phenoxy	?	?	?	?
7	11/8/99 Inspection	Tomatoes	Plastic house 2500m^2	?Phenoxy	?	?	?	Likely to be fruit damage – considerable
8	4/5/00 Inspection	Tomatoes	Wood/glass house 500m^2	Non-hormone	?	Council contractor	?Roadside	?$6000–7000
9	3/7/00	Field lettuce	14.5ha	Pasture Kleen Relay	Helicopter	Contractor	Pasture weeds	Serious damage Est >$100,000 Civil action considered
10	10/7/00 Inspection	Tomatoes	Glasshouse 4000m^2	?Phenoxy	?	?	?	?Loss minimal
11	11/7/00 Inspection	Tomatoes and hydro-lettuce	Plastic house 2500m^2	?Phenoxy, Pasture Kleen	?Vertical upward spray rose	?	?Thistles	Badly affected plants
12	11/7/00 Revisit 48 days later	Tomatoes	Faber glass 27,000 m^2–75,000 plants	Phenoxy	?			Serious damage $119,340
13	21/7/00 Inspection	Tomatoes	Wood/glass house 1430m^2	?Phenoxy	?	?	?	Negligible
14	21/7/00 Inspection	Tomatoes	Wood/glass house 1672m^2	Phenoxy	?	?	?	Serious Approximately $58,000
15	31/7/00 Inspection	Tomatoes	Venlo Wood 2400m^2	Phenoxy type	?	?	?	Serious 40% loss of income Approximately $82,800
16	8/8/00 Inspection	Tomatoes	Wood/glass house 1450m^2	Phenoxy	?	?	?	3 weeks' production $5200
17	18/8/00 Inspection	Tomatoes	Glasshouse 2000m^2	Hormone	?	?	?	Serious Approximately $68,000
18	10/10/00 Inspection	Tomatoes	Glasshouse 2000m^2	Hormone	?	?	?	Scattered damage
19	13/11/00 Inspection	Tomatoes, capsicums, chillies	Wood/glass house 750m^2	Phenoxy	Tractor with boom	?	?Thistles and dock	Very serious $15,000 Also rose damage on separate property

	Date	Crop affected	Location	Agrichemical	Use method	Applicator	Used for	Damage
20	6/3/01 Inspection	Tomatoes	Wood/glass house 1500m^2	2,4-D tested	?	Contractor	?Kiwifruit shelter sprayed	Hive of bumblebees killed Plant damage
21	17/3/01	Tomatoes	Harford Plastic 275m^2	?Phenoxy Roundup Tedion	?	?Contractor	Some gorse sprayed Roadside spraying	Also some cultural problems
22	4/4/01 Inspection	Tomatoes	Wood/glass house 2000m^2	Hormone	?	?	?	Plant damage

Farmers Mutual Insurance Company spray drift payments (mid 1997–2001)

Number	Description	Area	Total payment ($)
1	2,4-D spray contamination of neighbour's tomatoes	Waikato	50,163.61
2	Spray drift Round-up affected neighbours seedling pear trees	Top South Island	45,781.30
3	Spray drift 2,4-D onto neighbour's crop	Top North Island	45,185.21
4	Neighbour's crops damaged by 2,4-D spray	Waikato	28,264.77
5	Client's grape vines died – possible legal liability	Otago	14,051.96
6	Client was helicopter spraying and drift occurred	Lower North Island	11,743.98
7	Spray drift damaged neighbour's pear crop	Lower North Island	11,320.26
8	Hormone spray drift onto neighbour's orchard	Waikato	4407.45
9	Spray damage to property	Waikato	2671.71
10	Spraying weeds and spray drifted onto neighbouring property	Waikato	2664.98
11	Neighbour is claiming for spray damage and loss of production	Lower North Island	1966.93
12	Spray drifted onto neighbour's property killing kiwifruit vine	Waikato	1243.60
13	Spray drifted onto neighbour's hydroponic lettuce crop	Top North Island	1021.98
14	Used Round-up along fence and spray drifted and damaged neighbour's pea crop	Top South Island	836.94
15	Lime spray drift onto kiwifruit at neighbouring property	Top North Island	560.48
16	Spray drift onto neighbour's property	Top North Island	525.81
17	Spray drifted onto neighbour's orchard	Waikato	479.80
18	Spray drift onto neighbouring property		416.40
19	Peas damaged – residue in tank	Top South Island	330.50
20	Potential spray drift claim	Top South Island	302
21	Cut roses	Lower North Island	108.36

Appendix 6: The Hazardous Substances and New Organisms Act (1996) and Agrichemical Trespass

Introduction

The following is a précis of the tools provided by the Hazardous Substances and New Organisms Act to reduce instances of agrichemical trespass. For more detail the Hazardous Substances and New Organisms Act and regulations, and Environmental Risk Management Authority (ERMA) guidance material on applying controls should be consulted. Reference is made to the existing system for comparison, a discussion of the existing system can be found in the report on *Management of Agricultural Spray Drift* (Parliamentary Commissioner for the Environment, 1993).

The purpose of the Hazardous Substances and New Organisms (HSNO) Act *is to protect the environment, and the health and safety of people and communities, by preventing or managing the adverse effects of hazardous substances and new organisms.* Given that the HSNO Act is about *managing* risk, not avoiding it all together, once a hazardous substance has been approved for use in New Zealand its adverse effects will be controlled, not completely removed.

ERMA will assess all new hazardous substances (as well as transfer, and where necessary reassess, existing substances) and apply a set of controls to each substance. There is a "toolbox" of controls, largely contained in the regulations that ERMA can use.

The definition of agrichemical in the committee's terms of reference (any substance manufactured for the purpose of causing mortality, inhibited growth, or inhibited reproduction in an organism) corresponds to the term "biocidal action" in the Hazardous Substances (Minimum Degrees of Hazard) Regulations 2001. This means that all agrichemicals of interest to the committee will fall within the scope of the HSNO Act as hazardous substances.

Overview of how the Hazardous Substances and New Organisms Act (HSNO Act) will manage hazardous substances with toxic or ecotoxic properties, e.g. agricultural chemicals

There are a number of control methods available within the HSNO Act to minimise off-target exposure to agrichemicals. The principal regulatory mechanisms are contained in:

- Hazardous Substances (Minimum Degrees of Hazard) Regulations 2001; a substance must meet at least one of the threshold criteria to be considered hazardous
- the Hazardous Substance Classification Regulations 2001, which assign a hazard classification or classifications to a given substance (Classes 1–9) based on its hazardous properties, e.g. its degree of (human) toxicity or ecotoxicity
- the control regulations triggered by these classifications provide a number of mechanisms to reduce the likelihood of any unintended exposure to a substance. For toxic (Class 6) and ecotoxic (Class 9) substances these will be contained in the Hazardous Substances (Classes 6, 8 and 9 Control) Regulations 2001(HS (Classes 6, 8 and 9) Regulations).

A key mechanism in the control regulations is the setting of "tolerable exposure limits" and "environmental exposure limits". Tolerable exposure limits (TEL) must be set when a toxic substance is likely to be present in one environmental media, or a person is likely to be exposed to it during their lifetime. In addition, unless a specific environmental exposure limit (EEL) is set for an ecotoxic substance, default values will apply as the EEL.

The TEL and EEL provide a maximum allowable concentration of a substance in particular media, e.g. water, soil, sediment, on surfaces, and for the TEL, in air. The regulations require this concentration set at a level below that which could reasonably affect other living things or people in the environment. The process for setting these is described in more detail below.

When an exposure limit has been set, it will become an offence to use a substance in a way that causes the concentration of substance in that environmental media to exceed the exposure limit. Setting a level for unintended exposure that must not be exceeded, rather than having to prove an adverse effect, is a new approach to managing hazardous substances.

There are a number of other controls that may apply to a hazardous substance across its lifecycle, and many of these will apply to agrichemicals. These include (s 76 HSNO Act) requirements for:

- packages or containers to be strong enough to retain their contents
- identification, including labelling and more detailed documentation of the hazards
- disposal requirements, which will generally oblige reducing the hazard of a substance before it is disposed of
- being prepared to manage an emergency, e.g. what to do if a spill of an ecotoxic substance occurs
- tracking of certain substances, which means recording their location and who is in charge of them
- qualifications for hazardous substance handlers, e.g. so that agrichemical spray contractors fully understand how to handle the chemicals they use. Certain classes of substances have trigger quantities, over this amount they can only be used by approved handlers (r9 (HS (Classes 6, 8 and 9) Regulations).

In addition to these general requirements the Hazardous Substances (Classes 6, 8 and 9 Controls) Regulations also contain particular control mechanisms for both toxic and ecotoxic substances, these include:

- a standard of equipment that must be met, for example, to ensure accurate delivery of an agrichemical
- a requirement to keep a record of application or discharge of certain subclasses of substance. Many agrichemicals will require these records.

It is worth emphasising that when applied to agrichemicals, the controls described above make it an offence not to comply with the controls, e.g. for record keeping it will become an offence under the Act not to keep records. The following table sets out the controls and their consequences for managing agrichemicals.

Type of control	Consequences for the management of agrichemicals
Environmental exposure limit Tolerable exposure limit	Makes it an offence to allow more than a certain concentration of an agrichemical anywhere other than the place where the substance is being applied.
Record keeping requirement	Obliges an operator to record (and have available for inspection) where and how an agrichemical was used.
Equipment standards	The equipment must dispense or apply the agrichemical at the design rate. The equipment must retain the agrichemical without leakage. The equipment must have a maintenance and use record kept.
Quantity restrictions	Certain quantities of agrichemicals can only be used under the direct control of approved handlers. Certain quantities of agrichemical must be kept secured.
Additional controls on toxic and ecotoxic substances as baits	Baits must have particular colours, release methods, use of repellents or attractants, etc.
Packaging	Agrichemical containers must be strong enough for normal handling so as not to break.
Identification (labels, signs, detailed information for trained people)	Agrichemicals must be kept in a container with proper information on the label. Signs must be erected in advance of laying poison baits.
Emergency preparedness	Users of agrichemicals should have a plan to deal with spills.
Disposal	Agrichemicals should be used for their specified purpose and washings disposed of to the application area. Any residues need to be treated so they are not hazardous.

On-target use of agrichemicals

In some places where use of substances with toxic and ecotoxic properties can occur, the TEL and EEL limits may be exceeded but only in a controlled manner. These places include workplaces and "application areas", where the public are generally excluded.

A TEL applies outside workplaces and in those parts of a workplace that the public has access to. A workplace exposure standard would apply in the rest of the workplace. A workplace exposure standard is generally for the air concentration of a substance and can be set by ERMA to specifically protect workers from the adverse effects of toxic substances. As workers do not include children or the elderly, workplace exposure standards are based on an eight-hour work-day for healthy adult populations and are generally higher than a TEL. This is also because of the limited time of exposure, compared with a potential continuous environmental exposure, and because of the use of protective measures in the workplace. An EEL will only apply in the "natural" environment and not inside buildings, and therefore not in all workplaces. However as most applications of agrichemicals occur outside, the concept of an application area was developed.

An application area is an area of land that a person may legally apply a substance to, and includes the air and water contained on that land. To apply substances with ecotoxic properties (i.e. those with a biocidal action) in an "application area" certain additional controls must be met. These include an application rate set on all substances with a biocidal action by ERMA, certain restrictions in areas with bees and birds, and controls on bait formulation. Vertebrate poisons (Class 6.1 substances) also have additional controls placed on their use in baits largely relating to signage.

Transition to the new HSNO system

It will take some time to apply the new HSNO controls to existing agrichemicals because of the large number of chemicals and the need to apply controls in an orderly manner. Transitional arrangements will be in place for up to five years from the commencement of the hazardous substance part of the HSNO Act. This will mean that existing arrangements will remain in place for substances currently legally in New Zealand, and over the next five years the new system will gradually become prevalent as new substances are approved, substances are transferred *en bloc*, or possibly reassessed.

Setting a tolerable exposure limit

To establish a TEL, firstly, an Acceptable Daily Exposure (ADE) or a reference dose (RfD) for the substance is calculated. This is the quantity of substance that a person could be exposed to every day over a lifetime, and not be adversely affected. The ADE is developed for the population as a whole, while an RfD is developed for particular sub-populations. To do this, data from many sources (e.g. results from laboratory exposure of test animals, chemical calculations or work incident histories) is analysed to find the quantity of the substance that should not adversely affect animals or humans, the "no observable adverse effect" level or the "lowest observable adverse effect" level. This amount is then divided by a number that is determined by the level of uncertainty in the data, such as the quality of the data, the type of effect (e.g. immediate as opposed to long term) and variations in sensitivity to the substance. This will typically result in a quantity that is between 1/100th and 1/10,000th of the original "no observable adverse effect" quantity. It should be emphasised that calculating an ADE will be based on all types of toxic effect, not just those that occur immediately (called acute toxicity). An ADE or RfD is expressed as an amount per person per day.

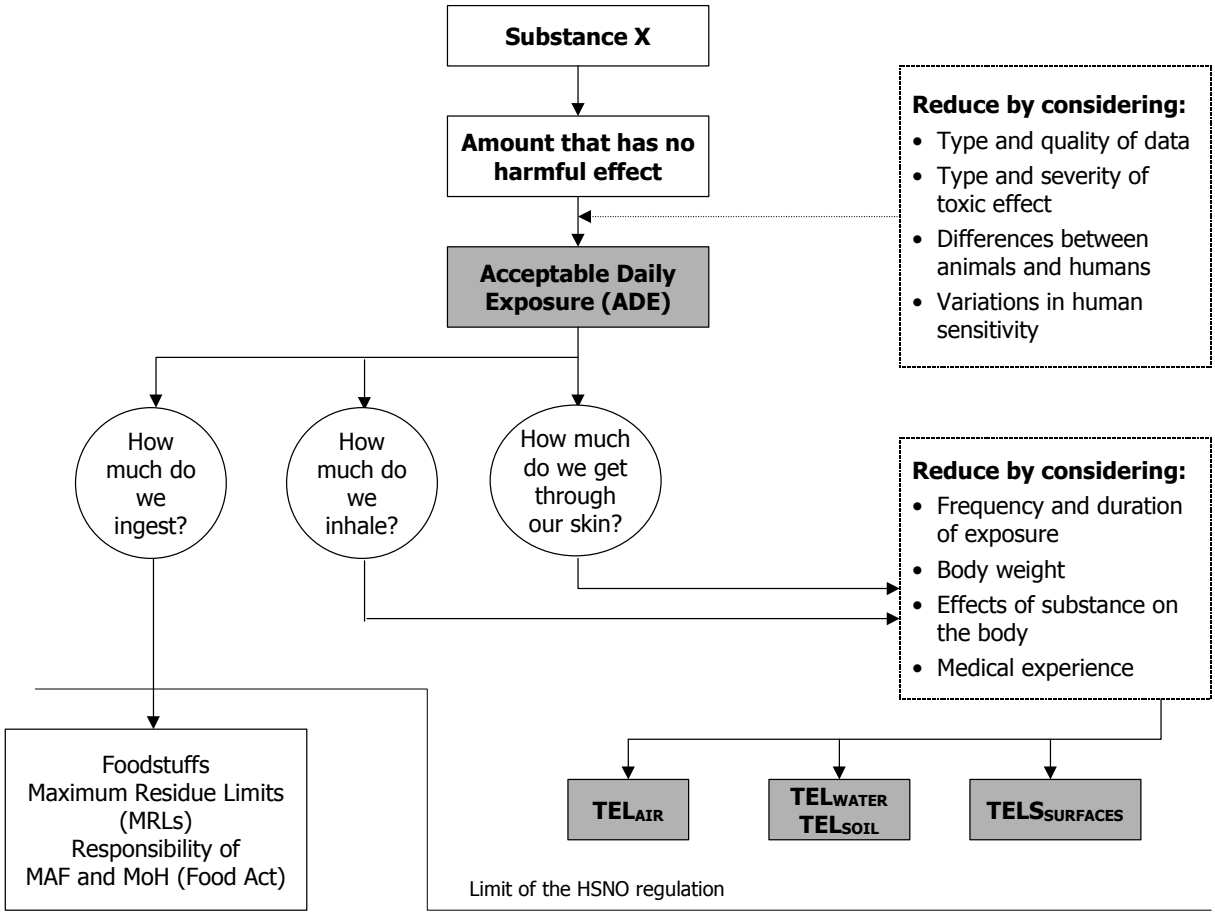
The next step is to convert the ADE or RfD into a potential daily exposure value (PDE) for each exposure medium (e.g. for toxic effects this could be by air, water, ingestion, contact with soil or surfaces). This will give a percentage of the ADE or RfD for each exposure media, expressed as "mg of substance/kg of body weight/day". To do this, the ADE is divided up according to whether people are likely to be exposed to the substance by inhaling it, ingesting it or getting it on their skin. For example, inhaling it from the air might contribute half of the overall ADE, and ingesting it from food, a quarter, etc.

This potential daily exposure value for each medium is then translated into a concentration in air, water, soil and surfaces (that is, a TEL), and also food and drinking water. Allowable exposure through food and drinking water is not covered by a TEL and is set as a maximum residue level under the Food Act. At this stage in the calculation, a further range of factors is considered. These factors, all of which are applied to reduce the possible level of exposure, include:

- whether people are likely to be exposed to the substance just once, or repeatedly over a long period of time
- how the substance gets into the body and how it behaves once it is in there
- what medical evidence is available that might suggest that the substance has serious effects on people at very low levels.

At the end of this process the enforceable TEL will lead to very much smaller exposures than the "no observable adverse effect" levels. In addition these limits will be very small where the substance is very toxic (irrespective of whether the toxic effect is immediate or delayed). For example, a highly toxic pesticide will have a very low TEL set (there may well be some set very close to a zero amount) whereas a less toxic pesticide may have a higher TEL set (i.e. a larger amount). This reflects the fact that the HSNO Act is very much about managing risk based on the best available science, rather than avoiding risk altogether.

Diagram 4: Tolerable exposure limit development process



Setting an environmental exposure limit

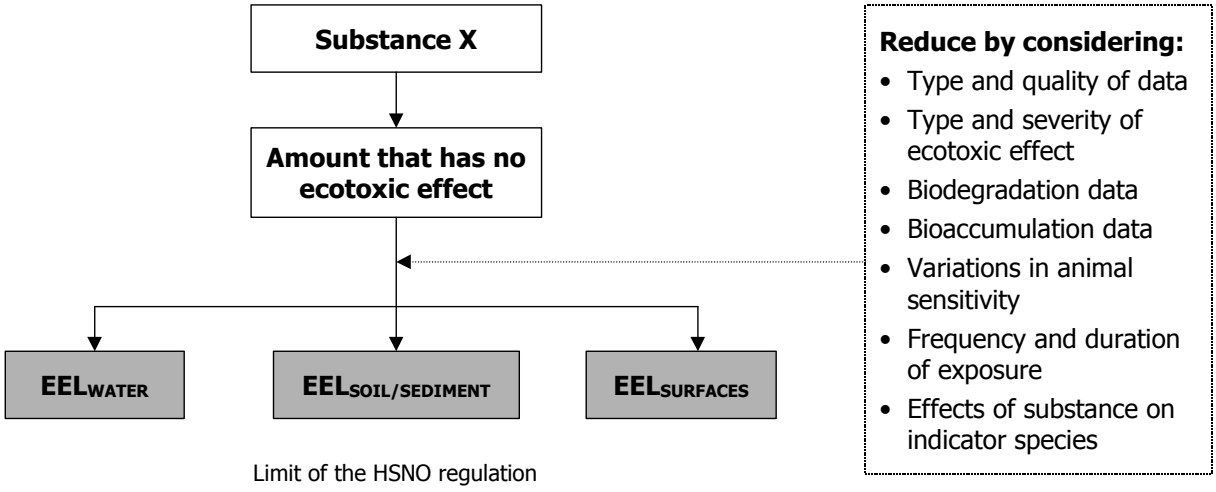
Setting the environmental exposure limit (EEL) is a slightly simpler process as there is no calculation of a potential daily exposure. Again, the equivalent of a "no observable adverse effect" level for a relevant ecotoxic effect on a relevant species is determined, and divided by a factor determined by the level of uncertainty in the data. The main uncertainty factors for ecotoxic effect is the level of bioaccumulation of a substance and how readily degradable it is.

This figure is then translated into a concentration in the environmental media, i.e. an EEL set for each of the media: water; soil/sediment; surfaces.

It should be noted that for EELs there are default values that apply if no EEL is determined using this process (r31 HS (Classes 6, 8 and 9) Regs). In certain circumstances there is also provision for ERMA to adjust the EEL for substances that rapidly degrade (r34 HS (Classes 6, 8 and 9) Regs). Reasonable mixing is allowed for an EEL set on a substance in surface water.

A unique situation occurs for ecotoxic substances if an organism becomes poisoned from ingesting other organisms affected by an ecotoxic substance, e.g. dogs may eat 1080 poisoned animals. To account for this situation ERMA can set an EEL based on secondary poisoning effects, in a similar manner to that described above.

Diagram 5: Environmental exposure limit development process



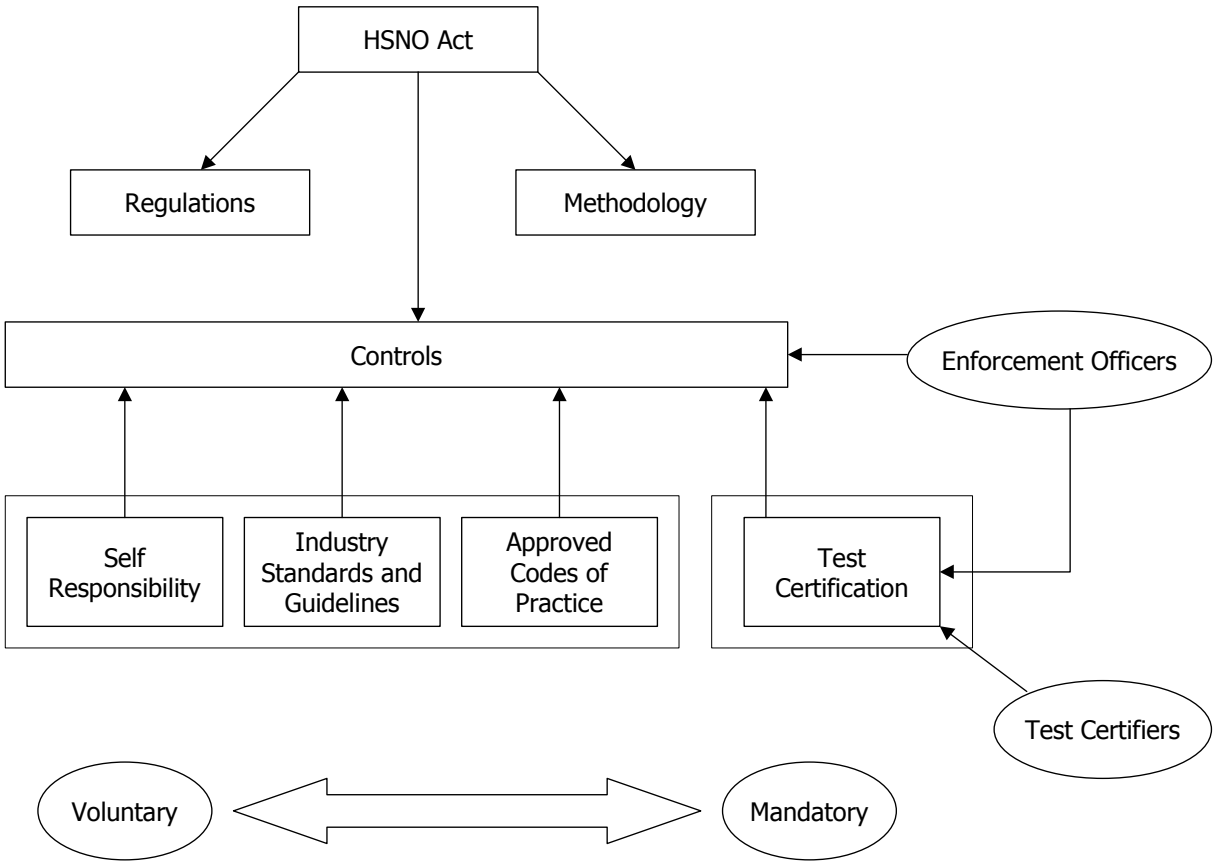
Compliance and enforcement under the HSNO Act

Compliance with the controls under the HSNO Act starts with (s 13) a general duty on every person who imports, possesses or uses a hazardous substance, to avoid, remedy or mitigate any adverse effect caused by them, and to ensure they do not contravene any requirements of the Act. While there is no offence under this section there is the ability to serve a compliance notice on a person if their use of a hazardous substance is or is likely to have an adverse effect on the health and safety of people or the environment. A compliance order is enforceable but must be served by an enforcement officer.

More significantly, the controls imposed on a hazardous substance are directly enforceable and, like the RMA, any person may take an enforcement action. This may be particularly relevant for agencies that do not directly employ enforcement officers under the HSNO Act, e.g. regional councils.

From the user's point of view compliance will also be achieved through voluntary industry standards and guidelines, and through approved codes of practice (s 79 HSNO Act). Compliance with an approved code of practice is a defence (s 117(3)(a) HSNO Act). ERMA can approve codes of practice once the Act comes into force. It is anticipated that ERMA will consider approving *NZS8409:1999 Code of Practise for the Management of Agrichemicals*.

Diagram 6: Compliance system



Source: from a diagram by ERMA.

The enforcement agencies are set out in s 97 of the HSNO Act. These include a range of government agencies including territorial authorities but not regional councils. Regional councils will be directly involved with hazardous substance management through the RMA and their regional plans. Essentially agencies will continue to enforce their legislation in their relevant areas with the additional requirement to also enforce the HSNO Act in those same areas. Territorial authorities will enforce the HSNO Act in those places where no other agency is responsible and they can enforce the Act at the same time as undertaking RMA enforcement. During the transition period territorial authorities will continue to enforce dangerous goods provisions. Health protection officers employed by the local public health services will continue to enforce provisions in relation to toxic substances, e.g. issue poisons handling licenses.

The enforcement system under the HSNO Act differs from the existing system in several important ways:

- there is only one agency that assesses and approves substances (i.e. ERMA) the old licensing function of various agencies is gone
- the HSNO system applies to all hazardous substances
- now environmental effects must be considered
- agencies must also co-operate in their enforcement efforts to provide complete coverage and this is overseen by ERMA (s 98)
- it is possible to transfer the power to enforce the Act (s 98) to some other agency or person. This will happen in certain areas and will be formalised in memoranda of understanding (MOU). The MOUs must be notified to ERMA, and for central government agencies, approval is also required from the responsible Minister.

This is likely to mean that several agencies will still be involved in managing agrichemical trespass incidents.

Of particular relevance to agrichemicals, enforcement officers will, be able to check:

- the records showing application or discharge, including location and wind speed, of certain subclasses of substance (r4 HS (Classes 6, 8 and 9) Regs). The intention is to assist in identifying where an agrichemical came from, particularly if only one discharge has occurred in an area
- the application equipment and protective clothing meets certain standards which can be checked
- that only approved handlers are using the specified quantities (see Appendix 1, Schedule 1 HS (Classes 6, 8 and 9) Regs) of certain substances, or that the substances are secured.

As noted above, an offence will have been committed if the TEL or EEL has been exceeded and does not require the proof of damage to health or property previously necessary (e.g. under the Pesticides Act or Health Act). There is still the requirement to prove causation and a certain standard of evidence will be needed for prosecution. Any person can lay a complaint about an offence (s 109(2)). An enforcement officer can only serve a compliance order or infringement notice.

Appendix 7: The Resource Management Act 1991 and Agrichemical Trespass

The purpose of the Resource Management Act is to promote the sustainable management of natural and physical resources. The Act's purpose includes avoiding, remedying or mitigating any adverse effects of activities on the environment, which is particularly important for issues of agrichemical trespass.

The Resource Management Act (RMA) can be used to control activities that might lead to agrichemical trespass. Specific controls can be applied through rules in regional and district plans (including rules on discharges and land uses), and through requiring resource consents.

Regional councils have functions under section 30 of the RMA to control the use of land to prevent or mitigate adverse effects of the storage, use, disposal and transportation of hazardous substances. They are also tasked to control the discharge of contaminants to air, land and water.

Territorial authorities have functions under section 31 of the RMA to control subdivision of land, and to control the use of land including the avoidance or mitigation of any adverse effect of the storage, use, disposal or transportation of hazardous substances.

Regional policy statements and plans

Each region in New Zealand has a regional policy statement that aims to achieve the purpose of the RMA. The statement provides an overview of resource management issues within the region and policies and methods to achieve integrated management of the region's resources.

The regional policy statement sets out responsibilities for hazardous substances to address the apparent doubling up of function between regional and territorial authorities. The policy statement should specifically include responsibilities for developing objectives, policies and rules to control the use of land to avoid or mitigate the adverse effects of hazardous substances, or particular groups of hazardous substances.

Plans (both regional and district) may contain rules that prohibit, regulate or allow activities to enable regional or district councils to carry out their functions and achieve the purposes of their plans. The actual or potential effect of an activity will determine whether it is permitted, controlled, discretionary, prohibited or non-complying. Each level of control of an activity would have different requirements to be met. For example, a discretionary activity would need a resource consent, or, a pesticide application activity is permitted provided neighbours are given 12 hours' notice, the applicator has a GROWSAFE® certificate and sensitive areas have been identified.

Regional plans are optional but can be prepared to assist a regional council to carry out any of its functions under the Act. Many regions have a regional plan that deals with the management of air quality. Some of the regional air plans deal with agrichemical use and of those, most allow agrichemical use as a permitted activity, as long as the activity meets certain conditions. Some plans differentiate the controls on the basis of criteria such as size, scale and method of application.

District plans

Each district in New Zealand has a district plan to assist the territorial authority to carry out its functions and to achieve the purpose of the Act. District plans may contain a range of land use and subdivision controls that may manage aspects of agrichemical use and avoid or mitigate agrichemical trespass. The Parliamentary Commissioner for the Environment (1993) listed a range of measures that might be useful to include in district plans to avoid agrichemical trespass, including conditions that could be applied to rural-residential subdivision in high agrichemical use areas. Recommended measures included allowing sufficient flexibility in block size of rural-residential subdivision so that larger blocks could be next to agrichemical users, and also ensuring rural building lines are an appropriate distance from the boundary.

Controls on the use of land

Land-use controls are specified under sections 9 and 10 of the RMA. Land can be used in any manner, provided it does not contravene a rule in a district plan. If the land use does contravene a rule in a plan it may still be allowed if a resource consent is obtained, or in certain instances, where the use is an "existing use".

Section 11 of the RMA is based on the presumption that the subdivision of land is not allowed unless provided by a district plan. Various conditions can be applied under section 220 of the RMA including requirements for bulk, height and location of structures. District plan provisions for subdivision often specify a minimum lot size.

Discharge of contaminants

Controls on the discharge of contaminants are specified under section 15 of the RMA. A contaminant is defined in the Act as a substance that changes the physical, chemical or biological condition of water, air or land. The presumption in the Act is that no one may discharge contaminants into water unless allowed in a regional plan. No one may discharge contaminants into the air or onto land from an industrial or trade premise unless allowed by a rule in a regional plan. Discharges to air or onto land from production land and residential areas are generally allowed unless specifically controlled by a rule in a regional plan. Industrial and trade premises include factory farms but exclude other types of production land.

Compliance and enforcement

Section 17 of the RMA places a general duty on every person to avoid, remedy or mitigate any adverse effect on the environment arising from an activity they are responsible for. This duty is not in itself enforceable but an enforcement order or abatement notice can be served on a person to require them to stop doing anything that is noxious, dangerous, offensive or objectionable to the extent it is having an adverse effect on the environment.

Further, any person may apply to the Environment Court for an enforcement order or an interim enforcement order, which could include requiring someone to stop an activity that has an adverse effect. These orders take some time to organise so their use for individual trespass events is limited. An abatement notice can be issued by an enforcement officer to avoid, remedy or mitigate an adverse effect. Instant fines are available in the form of an infringement notice and the range of fines available are set by regulation.

The prevalence and success of enforcement action under the RMA in cases of agrichemical trespass incidents appears to be limited. Data on agrichemical trespass incidents is presented separately.

Appendix 8: District Plan Provisions Relating to Agrichemical Trespass

A Review of District Plans to Identify Land Use Planning Controls that Mitigate Agrichemical Trespass (Harrison Grierson Consultants, June 2001).

Commentary

1 Background

The Ministry for the Environment has engaged Harrison Grierson Consultants Limited to undertake a brief review of district plan provisions addressing agrichemical trespass, for the assistance of the Ministerial Advisory Committee to investigate agrichemical trespass. The term "spray drift" is used hereafter in the interests of brevity.

The brief sought the *"review of district plans to locate and describe those provisions that could be used to avoid, remedy or mitigate the effects of agrichemical use on off-target areas"*. The purpose of the work is to identify how far district plans are being used to provide a solution to agrichemical issues and which plans provide a good model solution.

It is noted that territorial authorities have functions under the Hazardous Substances and New Organisms Act 1996, the Local Government Act 1974 and the Health Act 1956 (to mention more relevant legislation) that provide them with alternative ways to address the effects of off-target spray drift. This review is limited by the brief to considering provisions in district plans prepared under the Resource Management Act 1991.

1.1 Relevant reports

There are several reports that contain useful comments about the type of district plan provisions that could be useful for addressing the effects of spray drift:

1) The 1993 report *Management of Agrichemical Spray Drift* by the Parliamentary Commissioner for the Environment. The report contains a recommendation that provision be made in district plans to manage the effects of spray drift.

This review has found that district plans are increasingly taking the issue of spray drift into account. The trend is in line with the recommendations of the Parliamentary Commissioner.

2) The 2000 report *Managing Rural Amenity Conflicts* published by the Ministry for the Environment. The report includes a section on techniques for managing rural amenity conflicts, including a number of suggested methods for district plans – site coverage rules, nominated building platforms, and various controls on subdivision.

Of particular note and relevancy in the above report is the discussion in Appendix 1 on reverse sensitivity and the case law on how rural subdivision is in some cases restricted because of the effects that existing rural activities (including, conceivably, spray drift) might have upon the new dwellings. The *Wairoa Coolstores (1994) Ltd* (A016/98) case involved the potential effect of spraydrift on a proposed new activity. The Environment Court saw fit to restrict the new activity because of the risk of adverse environmental effects.

3) The 2000 report Assessment Guide for Hazardous Facilities: a resource for local authorities and hazardous facility operators published by the Ministry for the Environment.

The above report is written with a far broader scope and is not as immediately relevant, but does set the context of the various relevant statutes well.

1.2 Contents of this review

There are three parts to this review:

a) the commentary (these next few pages)

b) the table

c) photocopies of relevant provisions in district plans.

The purpose of the commentary is to highlight relevant provisions of the district plans surveyed, in particular those provisions that are most suitable for addressing agrichemical use.

The table starting on page seven provides a summary of all policies and methods found to be directly or indirectly relevant to agrichemical use. Thus the listed district plan provisions have a greater or lesser ability to contribute to avoiding, remedying or mitigating the effects of agrichemical use on off-target areas.

Copies of all the plan provisions listed in the tables are provided with this review. The copies are inevitably bulky and have been separated into plastic folders, one folder for each district plan.

1.3 Scope of the review

The district plans that have been reviewed are listed on page six. These plans were selected on the basis that they covered areas with significant horticultural and/or forestry activity, where the potential for adverse off-target effects of agrichemical use is more likely. Several sources from Statistics New Zealand were consulted in order to identify areas with greater levels of horticultural and forestry activity.

An additional factor was to provide geographic coverage, but this was of secondary importance in the selection of candidate district plans.

2 The contents and effect of district plans

This section briefly describes the way that the Resource Management Act 1991 (RMA) has allocated functions to territorial authorities, prescribed the contents of district plans, and set out the matters that consent authorities can consider when dealing with a resource consent application.

The first matter to note is that territorial authorities (i.e. city and district councils, which are required under the RMA to prepare district plans) do not have a function allowing them to address discharges to air (s 31 RMA sets out the functions of territorial authorities) directly. Hence this review has found that while there are numerous indirect provisions that could be deemed relevant to the issue of spray drift, there are few examples of provisions that have a direct effect and were installed for the express purpose of addressing the off-target effects of spray drift.

By contrast, several plans of unitary authorities were reviewed. Unitary authorities, having direct functions allowing discharges to air to be addressed, have relevant rules requiring the careful application of agrichemicals.

2.1 Contents of district plans

Section 75 of the RMA prescribes the contents of district plans. District plans are intended to contain a "nested hierarchy" of issues, objectives, policies and methods. The issues and objectives contained in district plans are "high level" statements. Policies also do not tend to have a high impact "on the ground" over an environmental issue such as the effects of spray drift.

However section 104 of the RMA requires consent authorities to have regard to the contents of relevant district plans when making a decision on a resource consent application. Hence regional councils (having direct functions to address discharges to air) can consider contents of district plans when dealing with consent applications for activities related to spray drift.

The methods (of achieving resource management objectives) in district plans include both regulatory (i.e. rules) and non regulatory (i.e. 'other means') methods. Rules and non-regulatory commitments contained in district plans have the most discernible effect on an issue such as spray drift.

2.2 The effect of district plan provisions

The table following this commentary contains a list of relevant district plan provisions. There are numerous examples of plans where there are policies that have relevance to the spray drift issue, yet have no provisions at the sharp end (such as rules or other means) that directly address spray drift. That is not surprising given that territorial authorities do not have direct functions to control the spray drift issue "at the nozzle".

While territorial authorities do not have direct functions addressing discharges to air, this review has found that approximately half district plans surveyed have direct provisions addressing spray drift. Additionally, the less direct provisions can be taken into account by regional councils considering resource consent applications.

3 Examples of useful provisions

The great majority of district plan provisions noted in the following table are only indirectly relevant to the issue of spray drift. There are two main categories of indirect provisions: those that control the form and density of development, and those that recognise "reverse sensitivity" issues.

Reverse sensitivity is a term that recognises that when new development occurs, such as increasing dwelling density in rural areas, the new dwellings can be adversely affected by activities occurring off-site. Almost all the district plans reviewed contain some recognition of the fact that new development in rural areas can find that existing activities cause adverse environmental effects on the newcomers. Hence district plans seek to contain provisions that help to reduce such land-use conflict in a number of ways.

Common ways to reduce conflicts such as spray drift affecting dwellings, include:

- controlling the density of residences in a rural area
- requiring building setbacks, which can be significant in rural areas
- other controls on subdivision that have an effect on the final built form of a development.

The provisions set out below are selected as good examples of their kind.

3.1 Objectives and policies

Waikato District Council's recent Proposed Plan Change 7 contains an Objective (9.2.2) that seeks to ensure that new lots are of a size that will ensure that significant levels of agrichemicals can be contained within the boundaries of the lot.

The Rodney Proposed District Plan (2000) contains numerous provisions to control spray drift. Policy 7.4.4(e) Rural Amenity Values states:

> *Subdivision and activities should be undertaken so that adverse effects, including cumulative effects, on amenity values are avoided, remedied or mitigated and in particular that:*
>
> *... (e) activities occur without generating drifts of chemical sprays across neighbouring sites.*

3.2 Methods including rules

Numerous territorial authorities include in their district plan a method promoting adherence to the *Agrichemical Users Code of Practice* (GROWSAFE®).

Franklin District Council includes a method (17.2.5) that the Council will provide information to rural residents about the type and effects of rural activities.

Numerous councils include rules requiring a building setback from plantation forests (a typical setback distance is 50m). Likewise, new plantations are often required to be setback from existing dwellings on neighbouring sites.

Rules requiring setbacks from boundaries for dwellings in rural areas are common. These setbacks have the effect of creating a buffer between dwellings and rural activities that could potentially cause a nuisance.

Whangarei District Council includes a Rule (36.5) that permits activities in their rural-residential buffer area if (*inter alia*):

> *(c) It does not involve commercial or industrial activities (including dairy factories) that are unusually sensitive to agrichemical sprays.*

The effect of rules such as the one above is to address issues of reverse sensitivity, where new activities might establish and be adversely affected by existing activities.

Manukau City has created a Rural Zone 3 that acts as a transition between urban and rural areas. The range of activities is limited to minimise potential conflicts, and living densities are lower than for urban areas.

Numerous councils include standard rules relating to the Hazardous Substances Screening Procedure (HFSP). One such rule requires a resource consent should an activity involve the use of hazardous substances with an effects ratio greater than the level set for the respective zone. Agrichemicals are deemed to be hazardous substances by the HFSP.

Gisborne District Council (a unitary authority) has established a Rural Productive Zone, where residential density is controlled to minimise conflicts with rural land use, including spray drift (refer table below for relevant rules).

Western Bay of Plenty District Council involves the use of Land Information Memoranda (LIMs) when controlling spray drift. Rule 2.3.5(c) and associated assessment criteria restrict new dwellings to a minimum setback of 30 metres. If the applicant is prepared to accept any adverse effects of reducing the setback, the Council makes a note on the LIM for that property. This provision is unusual, and appears to offer more flexibility than a blunt rule about setbacks.

Some district plans contain provisions that appear to push the boundaries (or *vires*) of what they are entitled to do. For example, Kapiti Coast District Council includes a Rule D.2.2.1 (Rural) that requires land use activities not to create airborne contaminants that create a nuisance at or beyond the boundary of the activity site.

Tasman and Marlborough districts contain provisions that are able to address off-target agrichemical use in a more integrated manner, because they have both regional and territorial functions. (For example, Tasman District's Method 5.1.20(b), Rule 17.4.4 (ga) and Marlborough District's Rules 1.12.1, 1.7.3, 1.7.5 – refer to the table following.) Territorial authorities do not have the functions to address agrichemical use so comprehensively.

4 Conclusions

There is a wide variation of coverage of the issue of spray drift in district plans. The following table shows that all district plans reviewed contain provisions that indirectly address spray drift. Hence many plans, by influencing matters such as the location and density of dwellings, are (wittingly or not) mitigating the actual and potential adverse environmental effects of off-target agrichemical emissions.

There is a discernible trend towards addressing spray drift in more recent plans, plan changes and variations to plans. Recent good examples include Rodney's and Western Bay of Plenty's district plans. At the end of the day, the effects of spray drift cannot be addressed comprehensively at a territorial level. Regional councils have more control of the issue (refer s 15(2) of the RMA). However, the influence over built form and land development that territorial authorities have, can and does contribute to mitigating the effects of spray drift.

The complete report will be available on http://www.qualityplanning.org.nz/index.php.

List of candidate councils

Council		Status of Plan
1	Far North District Council	Proposed
2	Whangarei District Council	Proposed
3	Rodney District Council	Proposed
4	Manukau City Council	Proposed
5	Franklin District Council	Operative
6	Waikato District Council	Operative
7	Gisborne District Council	Operative
8	Matamata-Piako District Council	Proposed
9	Western Bay of Plenty	Proposed
10	Whakatane District Council	Proposed
11	Napier City Council	Operative
12	Hastings District Council	Proposed
13	New Plymouth District Council	Proposed
14	Palmerston North City Council	Operative
15	Masterton District Council	Operative
16	South Wairarapa District Council	Proposed
17	Kapiti District Council	Operative
18	Horowhenua District Council	Proposed
19	Tasman District Council	Operative
20	Wairau-Awatere (Marlborough District Council)	Proposed
21	Hurunui District Council	Proposed
22	Waimakariri District Council	Proposed
23	Christchurch City Council	Proposed
24	Timaru District Council	Proposed
25	Waimate District Council	Proposed
26	Dunedin City Council	Proposed
27	Central Otago District Council	Proposed
28	Southland District Council	Operative

Appendix 9: Best Practice Examples

Best Practices for Avoiding Agrichemical Trespass (Richard Kempthorne, January 2002).

This is designed as a brief practical guide regarding approaches that can be implemented to minimise agrichemical drift hazard. It is not intended to answer every question with specific details but is rather setting out the principals involved.

Avoidance of agrichemical trespass (spray drift) requires only two things:

- the right attitude of the person applying agrichemicals, with the intention to avoid causing agrichemical trespass
- knowledge of what is important and what to do.

What is important?

a) Minimising drift

Weather conditions, particularly wind speed and the type of spray application equipment used are the two most important factors that influence the amount of spray drift that will occur

b) Minimising the drift hazard

Notification of agrichemical use, shelter belts and buffer zones will all reduce the level of any drift that does occur. Wind direction is important in terms of where any spray drift moves, and hence who or what might be at risk.

Each of these best practices is described in more detail below. They should all be part of the culture of the respective industries when it comes to agrichemical use.

Minimising spray drift

a) Application technology

The use of the most appropriate spray application equipment can have a significant impact on reducing potential agrichemical drift. The two main factors are spray release height and spray droplet size. To minimise spray drift, release height should be as low as possible, and spray droplets as large as possible. In practice a compromise has to be reached. In orchard situations for example, the tops of trees must be sprayed, which determines spray release height, and good spray coverage requires smaller spray droplets. A solution therefore is to use tower sprayers, which dispense agrichemicals from a tower out and down, rather than airblast sprayers that blow agrichemicals up into the air. In other situations with modern herbicides, very large droplets can be used with good results, as total coverage is less important.

Modern sprayers used in vineyard situations apply agrichemicals in a very confined pattern compared to the conventional airblast sprayer. The orchard airblast sprayer will always produce more spray drift in a vineyard than the shrouded profile sprayer.

All growers should ensure that their machines are properly maintained and calibrated. Worn nozzles result in large numbers of small satellite droplets that are prone to drift. The trend to lower volume applications of more concentrated sprays utilising smaller droplet sizes could result in a higher proportion of applied active ingredients drifting off target and such developments should be carefully evaluated before widespread adoption.

b) Wind speed

The optimum wind speed is between 1–3 m/s (3–10 km/h). Higher wind speeds will produce more spray drift. If the wind speed is less than 1m/s wind direction becomes unpredictable.

Minimising spray drift hazard

a) Wind direction

The hazard presented by any spray drift depends on where it goes so wind direction is important. Careful planning of the timing of agrichemical applications to coincide with light wind directions blowing any agrichemical drift away from any areas that might be at risk is the ideal situation.

This is particularly important when chemicals such as 2,4-D are involved, as a very small quantity of agrichemical drift onto a sensitive crop can have devastating consequences. The use of wind direction is not limited to chemicals with known significant adverse effects only, but should be a technique used in all situations of agrichemical application as a sensible management technique.

b) Notification of agrichemical use

NZS 8409:1999 requires that, "Any person who may be affected by the use of agrichemicals has a right to information about what agrichemicals have been, or are to be used, and notification should be used to achieve that". This should include possible effects on human health or property damage.

It is important for those responsible for the application of agrichemicals to appreciate the principal of notifying those who may be affected. There are various rules in respective Regional Council (Air Quality) plans regarding notification and specifying notification distances. Specifying notification distances may not achieve adequate notification. The important principal is that those who may be affected have a right to know that agrichemicals are to be used or have been used.

Notification need not be onerous. Good practice would see an agrichemical applicator taking reasonable steps to avoid agrichemical trespass and a responsible approach to making others that need to, or may want to know, aware of the use of agrichemicals. This is generally received very well.

Contact should be made with those potentially affected by agrichemical trespass and notification procedures should be established for those who wish to receive notification. It is very difficult to make these procedures perfect. Notification may be by the use of signs. Spray plans should be available upon request for viewing for those potentially affected.

In the event of large properties with many neighbours, or agrichemical application in urban situations, technologies such as Telecom's Caller Connect can be used to automatically send a message to multiple recipients. Caller Connect is a solution to an otherwise nearly impossible task.

Methods of notification that impose an unreasonable imposition on an organisation's time and resources should be avoided.

c) Sensitive areas

Where there are sensitive areas, e.g. schools, parks or other public places, voluntary protocols can be developed demonstrating to respective communities that there is a genuine effort to avoid problems with agrichemical trespass. This should be encouraged. For example where agrichemical users are adjacent to schools, avoid spraying along respective boundaries between certain specified times when children are around. This develops a sense of co-operation and the community recognises and appreciates a genuine attempt to avoid drift.

d) Shelter belts

Shelter (spray) belts help to significantly reduce agrichemical trespass. Spray belts can be established by planting a single row or multi-tiered row (better) of trees to effect a natural screen for spray applications. It is important that the spray belt has sufficient porosity to allow "filtering" air movement rather than a complete barrier, which can have a dumping effect on air movement. Where a spray belt can be established, it will provide a very effective barrier to the discharge of ground applied agrichemicals and can significantly reduce agrichemical drift.

The use of spray belts may be more applicable to horticulture where agrichemical application is a consistent activity. Spray belts may not be suitable in pastoral farming where agrichemical application is very intermittent.

e) Buffer zones

The establishment of buffer zones, i.e. a distance of separation between agrichemical application and areas adversely affected by this activity, can also significantly reduce incidences of conflict associated with agrichemical application. Buffer zones work by allowing the concentration of any spray drift to fall below the level at which any risk is considered acceptable.

An example of the need for a buffer zone is where there are two adjoining land-based activities, one employing conventional and the other organic growing techniques. A grower using a BIO-GRO®gro label cannot have any conventional agrichemical drift without threatening their BIO_GRO® status. Using a buffer or separation zone in conjunction with an effective spray belt can enable both activities to successfully co-exist.

Who should provide the buffer zone? It seems only reasonable that if a new activity is being started that will require a buffer zone, it should be provided by the owner of the new activity, rather than requiring an existing activity to have to sacrifice productive land potential. In the example used above of organic versus conventional, this would be whomever is coming in second.

John Maber – Potential drift hazard guide

Table Y1: Drift hazard guidance chart

	Potential drift hazard scale		
Factor	**High**	**Low**	**Comment**
Wind speed	Zero/very low (less than 1 m/s) or greater than 6 m/s	Steady (1–3 m/s)	Measurement or estimate using smoke
Wind direction	Unpredictable	Predictable, and away from sensitive areas	Use smoke to indicate
Humidity	Low (delta T > 8°C)	High (delta T< 4°C)	Measure, using whirling psychrometer
Atmospheric stability	Inversion layer present	No inversion layer	Use cold smoke to indicate
Maximum height of release of agrichemical	> 1.5 m above the target	< 0.5 m above the target	Application technique
Particle (droplet) size	< 50 microns diameter	> 250 microns diameter	See Appendix T
Volatility of agrichemical	High (vapour pressure > 10 mPa)	Low (vapour pressure< 0.1 mPa)	Product label
Sensitive area	Close (< 100 m) away	None, or more than 1 km distant	Identify on property protocol
Buffer zone	None	Yes (> 100 m)	Guideline only
Shelter belts	No shelter	Live shelter > 3 m high and 1 m thick	Not for herbicides
Toxicity	Scheduled agrichemicals	Unscheduled agrichemicals	Check label

Note:

(1) The potential drift hazard scale is given as high or low, and intermediate situations should be rated accordingly. For example, a droplet size of 150 microns diameter would represent a moderate drift hazard.

(2) Some factors in the chart can be changed to reduce the hazard rating, e.g. use lower volatility chemical, larger droplet size.

(3) All of the weather-related factors are to be assessed at the application site.

(4) Toxicity of the agrichemical has been included on the chart, but use of a schedule heading is only one indicator of toxicity and is not always sufficient. In all cases, users should select the least toxic agrichemical that is suitable for the specific application.

(5) 1 m/sec = 3.6 km/h; 6 m/sec = 20 km/h (approximately).

Enforcement protocol for spray drift complaints

Nelson Fruitgrowers Association and Tasman District Council

1 Complaint recorded – yellow complaint record form. Complainant advised that a Fruitgrower representative will be following up the complaint. Complainant requested to contact the Council again in two weeks if the problem persists.

2 Relevant Fruitgrower representative contacted and requested to follow-up complaint.

3 Fruitgrower representative to fill out a form for each complaint and post or fax a copy of this form to Council.

4 If a second (similar) complaint is received from the same complainant during the same spray season, either:

   i the Fruitgrower rep will re-visit the orchardist accompanied by the President of Fruitgrowers Federation (or the Vice-President if the President is not available); or

   ii the Council officer will accompany the Fruitgrower rep on a visit to the orchardist.

5 A letter shall be sent to the orchardist, with copies to the complainant and Fruitgrower representative, confirming any actions required to mitigate the spray drift problem and time frames within which they must be completed.

6 If a subsequent similar complaint is received from the same complainant during the same spray season, action will involve:

   i) liaison with the Agrichemical Education Trust to withdraw the orchardist's GROWSAFE® certificate (if there is evidence that the orchardist is not complying with the GROWSAFE® Code of Practice); or

   ii) the serving of an abatement notice.

7 Note that, if at any time, the complaint is found to be unjustified, the Council will be advised that further action will not be taken, and the Council officer will advise the complainant in writing.