MANAGEMENT OF AGRICHEMICAL SPRAY DRIFT

Office of the
PARLIAMENTARY COMMISSIONER FOR THE ENVIRONMENT
Te Kaitiaki Taiao a Whare Pāremata

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Research

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Preface

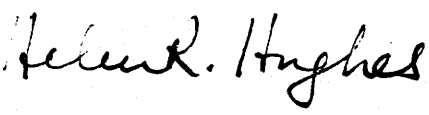
Chemical sprays drifting on to people, non-target crops and gardens is a widely experienced problem in both New Zealand and Australia. As the requirements for 'clean' export crops have become more demanding, the potential for involuntary exposure to agrichemicals by the public has increased.

At the present time, management of agrichemical spray drift is provided for in a multiplicity of Acts with potentially nine different public authorities being involved in their administration. None of this legislation gives adequate protection to the public, provides effective sanctions against misuse of agrichemicals or provides redress for people who believe they have been exposed to agrichemical spray drift.

It is time legislation was consolidated and simplified. Government has a responsibility to ensure the public is protected. The possible health effects from exposure to spray drift remain largely unknown and require further consideration by public health administrators.

The growers, the spray contractors and the forest industry groups have recognised their responsibilities and are developing codes of practice that include the need to minimise off-target spray drift. The industry is to be congratulated on its initiative in establishing the Agrichemical Education Trust and developing training programmes and a code of practice.

There is every reason to be cautious and recognise that prevention is better than cure and that avoidance of adverse effects is consistent with the purpose of the Resource Management Act 1991. The principles of reducing the quantities used, reducing risk through the use of codes of practice by competent, knowledgeable operators, and restoring public confidence through improved communication between users and their neighbours will assist both the industry and public authorities.



Helen R Hughes
Parliamentary Commissioner for the Environment

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1.0 Introduction

1.1 The Issue

The Parliamentary Commissioner for the Environment has, over the last seven years, received a number of complaints from people concerned about agrichemical spray drift. The situations brought to the Commissioner's attention include: spray drift from local council weed spraying, children exposed to agrichemicals used in school grounds, a car sprayed from an overhead aircraft, people exposed to drift arising from orchard or farm spraying and possible contamination of water supplies. These concerns are similar to the survey findings of the Ministry of Health ([then]Department of Health, 1990) which found a significant level of public concern over the risk of agrichemicals.

Where there are people, an incompatible land use, or a susceptible crop in close proximity, spray drift may cause an adverse environmental effect. The application of herbicides may give rise to effects some distance from the point of application.

The concern over off-target impacts of agrichemical spray drift raises questions about the system that is in place to mitigate such hazards, particularly the legislation and administrative procedures undertaken by public authorities.

1.2 Stakeholders

The management of off-target spray drift involves a considerable number of stakeholders:

* Central government agencies:
  - Ministry of Agriculture and Fisheries
  - Ministry for the Environment
  - Department of Labour Occupational Health & Safety Service
  - Ministry of Transport
  - Ministry of Health
* Regional councils
* Territorial local authorities
* Public Health Commission, Regional Health Authorities and Crown Health Enterprises
* Pesticides Board
* New Zealand Agrichemical Education Trust (NZAET)
* Contract operators, both ground and aerial
* Growers/farmers/orchardists
* Grower/user organisations, eg Federated Farmers, Vegetable Growers Federation, Fruit Growers Federation

* Agricultural Chemical and Animal Remedies Manufacturers Association (AGCARM)
* Residents' groups
* Environmental and public interest groups

1.3 Methodology of Investigation

The number of situations in which agrichemical sprays are used and in which off-target drift may occur is potentially very large. Areas in New Zealand which would have examples of the following situations were identified:

* different crop mixtures, eg market gardens, orchards, arable crops, pastoral agriculture;
* proximity of settlements to crops; and
* sensitivity of a receiving environment.

The Bay of Plenty, around Tauranga, and Canterbury, around Christchurch/Banks Peninsula, were chosen as case study areas. Information was obtained from representatives of the various stakeholder groups in these areas on the sprays being used, whether there were any off-target spray drift problems, the success or otherwise of mitigation measures, and the roles of public authorities in managing actual or potential off-target spray drift. A private horticultural consultant and the horticultural manager for a corporate enterprise were also interviewed in Canterbury.

Discussions were held with representatives of the various spray contractor groups. Information obtained from these stakeholders is summarised in chapter 3.

1.4 Terms of Reference

Terms of reference for this study were:

1. To identify possible control mechanisms to prevent spray drift onto off-target areas of the environment.

2. To identify the agency or agencies that are or should be ensuring that environmental effects of agrichemical sprays are confined to target areas.

3. To provide remedial advice as appropriate.

The investigation was carried out under the powers given by section 16 of the Environment Act 1986 as follows:

Section 16(1)(a): to review the system of agencies and processes established by Government to manage the allocation, use or preservation of natural and physical resources.

Section 16(1)(b): to investigate the effectiveness of environmental planning and environmental management carried out by public authorities.

2.0 Public Concerns

2.1 Introduction

The use of agrichemicals in New Zealand was examined in the report *Pesticides: Issues and Options for New Zealand* (Ministry for the Environment, 1989).

The report noted that some serious land use incompatibilities have been created where agrichemical use for farming or orchards conflicts with residential development. Often the incompatibilities are not perceived or not actively voiced at the time when land use changes are proposed. Other points highlighted in the report were the costs and technical difficulty of obtaining a conviction against an agrichemical user causing damage to others, and the lack of monitoring which would indicate the significance of agrichemical off-target spray drift and its impact on the environment and human health.

A Pesticides Technical Task Group was subsequently convened by the Ministry for the Environment and reported to Cabinet in January 1990. The findings of the Technical Group have provided input to the proposed Hazardous Substances and New Organisms (HSNO) legislation.

2.2 Accountability Issues

Several of the Commissioner's correspondents said that there did not seem to be a single agency that would address their concerns about the effects of a spraying incident. Often it appeared that the agency considered to have the prime responsibility was unable or reluctant to take action.

For example, a company that arranged the spraying of a potato crop declined to accept any responsibility when a car travelling on a road adjacent to the field was sprayed from an overhead aircraft. Enquiries with Civil Aviation Division, Ministry of Transport, resulted in an investigation of the incident, with the pilot being given only a verbal warning on the basis that he was "completely unaware that spray had fallen outside the boundary and onto a vehicle". Since the issue did not involve plant damage, the Ministry of Agriculture and Fisheries (MAF), which administers the Pesticides Act 1979, was not able to take any action. The local health authorities advised they would only become involved if some health impact had occurred.

2.3 Health Issues

A number of correspondents have raised the issue of a link between health effects and exposure to agrichemical sprays. The situations where this has been a concern include:

* agrichemical use within school buildings and grounds;
* potential contamination of water supplies; and
* alleged involuntary personal contact with agrichemical sprays.

Human health problems arising as a consequence of agrichemical use are claimed to receive scant official recognition (Toxins Action Group, 1987). There is a problem of lack of diagnostic techniques and conventional treatment methods to assess patients presenting with nonspecific symptoms claimed to be induced through exposure to agrichemical sprays. People have often felt their treatment by conventional medical practitioners has been less than satisfactory.

Public concern about the possible effects of agrichemical sprays on human health has not been matched by efforts to identify the degree of exposure, to detect chemicals in the body and to check whether health effects have resulted.

There have been few medical studies undertaken in New Zealand. A study of residents who complained about ill health in Waitakere City was done by the Auckland Area Health Board (Sinclair, 1991). Most complaints came from a recent subdivision in a shallow valley adjacent to horticultural land. It was not possible to prove that spray drift was having an ongoing effect on health. However, as a precaution, taking action to reduce potential exposure was suggested. Some of the health problems were found to be caused by inadequate ventilation and the build-up of irritant gases, such as formaldehyde, in the new houses.

One correspondent has described the continuing health problems suffered after alleged involuntary exposure to agrichemical sprays used in a nearby avocado orchard. The avocado trees are now so tall that spraying by helicopter is needed to give even coverage of the trees. Several neighbouring residents have felt unwell when organophosphate sprays have been applied to ensure that the fruit remains of export quality.

The local district council issued abatement proceedings in April 1991 on the basis of the spraying being a nuisance under section 29(1) of the Health Act 1956. However, recognising that the orchardist must spray, and that even on a calm day neighbours may be affected, all parties in this issue are looking for a satisfactory long-term solution.

Concern over contamination of a private water supply as a result of aerial spraying of weeds highlighted the limited controls available when negligence or wilful intent cannot be proven. Public water supplies have limited protection under the Civil Aviation Regulations.

Another correspondent expressed concern at a local authority's action in aerially spraying a river bank for weeds when the community's water supply came from the same river. In this instance it appeared the local authority took reasonable precautions and monitored the river water quality to ensure the community was protected. However, the extent to which this information was not readily available to the correspondent highlights the need for consultation and a free flow of information between those responsible for a spraying activity and the community.

2.4 Plant Damage

Although this investigation has not included the issue of plant damage, information has been provided to the Commissioner regarding the difficulty of obtaining redress for damage or even censure of the actions of an aerial spray operator who, it was alleged, caused damage to a commercial grower's sensitive crop.

Investigation by MAF of alleged breaches of the Pesticides Act 1979 involving plant damage are only undertaken if the complainant agrees to pay for the initial investigation. The Ministry has indicated that they would not prosecute because of their lack of funds, or where there were doubts over the adequacy of the evidence and ability to gain a conviction (Bouda, 1992).

The potential for contamination of organically grown produce by the spraying activities of neighbouring pastoral farmers who spray pastures for weed control or forestry companies who spray during land preparation for planting trees is also of concern.

2.5 Information

In several cases the correspondents' concerns would have been allayed if there had been more information available such as:

* information about the intentions of the grower to spray so that a neighbour could take action to avoid exposure;

* information about a neighbour's crops potentially at risk, so that the agrichemical user could take precautions;

* general information about the toxicity and potential environmental effects of the agrichemical.

The availability to communities of research information on the management of off-target spray drift would also be useful. For example, small amounts of chemicals with a strong odour can be detected kilometres away and people are unsure whether harmful off-target drift has occurred. More research is needed to ascertain the potential harmful effects from low concentrations of agrichemical drift.

2.6 Summary

These public concerns have identified several deficiencies in the present system for managing off-target spray drift which may be summarised as follows:

» No clear requirement or responsibility on a person applying agrichemical sprays to supply information to neighbours or the community;

» No single, clearly identified agency to contact if concerned individuals feel there has been a health risk as a result of off-target spraying activity;

» Uncertainty about which agency should hold data bases of information on health and environmental effects associated with the use of agrichemicals;

» Ineffective legislation to either manage off-target spray drift or readily compensate those affected by off-target spray drift;

» Lack of effective sanctions to ensure compliance with existing regulations governing the application of sprays;

» Inadequately resourced enforcement agencies, such as MAF, to enforce the regulations;

» Lack of recognition by health providers of potential agrichemical exposure symptoms in people.

3.0 Current Practice

3.1 Horticulturists

Spray Requirements

Horticultural producers growing fruit for export are generally required by their export marketing authorities to meet specific phytosanitary conditions. These are aimed at ensuring access of the crop to overseas countries by guaranteeing absence of pest and fungal infestation while ensuring that spray residues do not violate residue standards set by New Zealand's trading partners. International negotiations of these requirements try to ensure that they are scientifically justifiable and based on standard procedures for risk assessment.

The producer is expected to present a spray diary to the marketing authorities detailing agrichemical use. Requirements to control a certain pest or disease when conditions are not appropriate for spraying can place a grower under considerable pressure.

Spray Technique

A number of factors affect whether spray will drift onto non-target areas. However, for spray operations to be effective some degree of drift is necessary to achieve an even coverage of the whole of the crop plant surface. Small droplets may evaporate before they reach their target, especially in conditions of high temperature and low humidity.

The most effective coverage of the crop or weed is achieved if applications are made when there is a light positive breeze. Low wind speeds are less likely to result in off-target movement of sprays while stronger winds are likely to increase the risk of spray droplets moving off-target.

High volume airblast sprayers that apply water as a carrier at approximately 2,000 to 2,500 litres per hectare are generally used in orchards. An alternative technique is to use a low volume spray, applying liquid at 250 - 500 litres per hectare, which has been shown to be as effective as high volume spraying (Maber *et al*, 1986; Holland and Maber, 1991; Holland *et al*, 1992). In practice, low volume applications may use up to 1000 litres per hectare.

There is an increasing use of helicopters for spraying within orchards, particularly in avocado orchards where mature trees are 9 to 12 meters high. Helicopter spraying takes a shorter period of time. Lower total volumes of spray are used and the drift risk is reduced because the spray is directed downwards from a slow and low flying helicopter rather than being fired upwards from the ground from air blast sprayers. (Holland and Maber, 1992a; Anon, 1992). Growers quote comparative figures for a six hectare orchard of avocados as requiring, under ground spray airblast, application of 3 to 4,000 litres per hectare with 2 kilograms of active ingredient, taking up to 14 hours, whereas a helicopter may take approximately 1 hour applying 250 litres per hectare and using 1 kilogram of active ingredient. Helicopter spraying is, however, generally noisier and more visible than ground spraying. The actual concentration of the spray mix in the helicopter spray tank is higher than in a high volume airblast sprayer because the helicopter is applying less water and relying on its down wash of air to be a partial carrier of the agrichemical.

Alternative techniques of spraying tall crops include tower sprayers which may be 5.5 metres high. Their use requires a very level orchard floor, otherwise the tower becomes unstable or could clip the branches of trees, damaging both the trees and/or the equipment. A possible new technique which creates a static electric charge between the spray droplet and the trees resulting in an attraction between the droplets and the target plants and 'binding' of the droplets to the trees has become available. This technique requires further assessment.

The Forest Research Institute (FRI) is researching the computer simulation of conditions to minimise off-site spray drift from aerial application (Forest Research Institute, 1993). A computer model predicts spray deposition on the ground, in a plant canopy and off-site drift, given detailed inputs on spray droplet sizes, aircraft specifications, operating conditions and meteorological conditions. The model has been used to help define conditions suitable for aerial spraying in forest situations and the conditions incorporated into the Forest Owners' Association code of practice.

The growers welcome techniques to reduce spray use as a cost saving measure. They recognise that alternative techniques, such as Integrated Pest Management, have the potential to reduce spray use as well as to monitor pest build-up in orchards. The Horticulture and Food Research Institute provides a service which can help identify optimum spray times for some pests and diseases, thus reducing total spray usage by limiting it to times of critical pest incidence.

Effective calibration and maintenance of equipment can minimise spray drift (Holland and Maber, 1992b; Co-ordinating Committee on Agricultural Chemicals, 1993). There are no reliable data on the extent to which equipment that has lost calibration or equipment that has not been maintained could increase overspraying and off-target spray drift. For example, nozzle wear over time may almost double discharge rates (Wilton, 1984). Maintenance is at the discretion of the owner.

Containment of Spray

A feature of New Zealand horticulture is the extensive use of shelter belts primarily intended as shelter from wind and as a way of building up the heat units within a block. Research has shown these shelter belts are very effective at restricting spray drift beyond the block boundary (Holland and Maber, 1991; Agricultural Engineering Institute, 1987). Approximately an eight-fold reduction in absolute levels of drift was recorded 32 metres away from natural shelter in comparison with a situation where there was no shelter. Generally, natural shelter is more effective than artificial shelter in reducing spray drift.

Guidelines to increase the effectiveness of a shelter belt in this activity have been produced by the Agricultural Engineering Institute (Holland and Maber, 1991). Australian research (Harden, 1993) suggests that finer leaved species are more effective at controlling drift, and there has been a suggestion that some species may be more effective at removing agrichemicals from the air than others. There is no research into this aspect currently undertaken in New Zealand.

New Zealand researchers note that there is a trend toward the removal of natural shelter belts because of competition with the crop and the fact that some natural shelter species act as hosts to crop pests. In some sensitive situations it may be appropriate to use artificial shelter to help contain spray drift or to fill in gaps at the base of live shelter belts.

Where there are adjacent land uses that could be adversely affected by spray drift, some growers recognise that one option to reduce the risk of spray drift causing off-target damage is to leave an unsprayed crop row adjacent to the boundary. In doing so, they also accept a potential reduction in yield.

3.2 Vegetable Growers

In general vegetable growers do not have the same need to meet export phytosanitary standards as horticulturists because most vegetables are sold on the local market. There is, therefore, more room to accept less than 100% control of pests and diseases although New Zealand consumers still demand high quality produce.

Vegetable growers recognise two main problems with regard to off-target spray drift. The first problem relates to the use of agrichemicals when there is continued urban encroachment towards their boundaries. Because of this, the growers use agrichemicals as little as possible and subscribe to the New Zealand Agrichemical Education Trust code of practice. Boom spraying, which minimises the potential for spray drift, is more likely to be used than rose, hand gun or high volume airblast spraying.

The second concern is the likely damage to their susceptible crops as a result of ill-advised use of herbicides, particularly on adjoining properties. Commercial vegetable growers, especially those with glasshouses, are concered about local authorities spraying roadsides without sufficient warning. Glasshouse crops are likely to be highly susceptible to herbicides. The fan-driven systems in glasshouses have the potential to draw in the airborne fine droplets/vapour fractions resulting from nearby herbicide application.

Glasshouse growers using Integrated Pest Management and biological control techniques are concerned not to lose biological agents through the inadvertent introduction of agrichemicals from neighbouring operations. Vegetable growers consider the keys to the issue are improved user education, the observation by all agrichemical users of a code of practice and sanctions to ensure compliance with the code.

The growers consider that improved user education for home gardeners using various agrichemicals on adjacent land is also needed.

3.3 Pastoral Farmers

Pastoral farmers use herbicides predominantly to control pasture and scrub weeds. Pasture weeds are generally sprayed with a boom and scrub weeds with a hand operated spray gun. Chemicals are applied either by the farmer or by a contractor. In some areas aerial operators, using either fixed wing aircraft or a helicopter, may be used for pasture, field crop or for scrub weeds.

Discussions were held with two groups of farmers who acknowledged that nobody has the right to expose others to agrichemicals and that water sources should not be contaminated. The potential for exposure to agrichemical sprays is being reduced by the use of granule formulations and manual or mechanical methods of weed control.

Problems have also arisen when plant growth regulator herbicides have been used near susceptible crops which are more vulnerable because of their stage of growth. Pastoral farmers could plant shelter belts where adjacent sensitive land uses may be affected by sprays used for noxious plant control.

Noxious plant inspectors employed by public authorities can require farmers to clear certain weeds from farm land within specified time frames. This may result in additional agrichemical use.

An increased flow of information between users, their neighbours and others likely to be affected by spray activity is seen as necessary. One group of pastoral farmers believed it should be a requirement for farmers to notify all neighbours of their intention to apply sprays. They noted that where subdivision has increased in rural areas, some newcomers have been implacably opposed to the continuance of common existing land use practices. In the Te Puke area, however, there were no spray related complaints to the Area Health Board in the season following implementation of a 'Spray Safe' programme (Gately, 1991) in which growers advise neighbours of intended spray operations.

3.4 Codes of Practice

There are currently both voluntary and mandatory controls relating to agrichemical users but there is no effective control over the industry in relation to agrichemical spray drift.

The development by producer groups of voluntary codes of practice for agrichemical use is designed to train and educate their members to improve overall safety in the use of agrichemicals.

Agrichemical Users Code of Practice

Agricultural and horticultural industry groups formed a New Zealand Joint Primary Industry Working Party to prepare the *Agrichemical Users Code of Practice*. The code and an associated training programme are being actively promoted through the New Zealand Agrichemical Education Trust as the 'Growsafe' programme. There are accredited trainers throughout the country and to date approximately 3000 people have undergone training. The essence of the code's recommendations for minimising off-target spray drift is to use the appropriate chemical and to take account of weather conditions, equipment and nozzle type.

Forestry Codes of Practice

The New Zealand Forest Owners' Association has developed a code of practice entitled *The Use of Pesticides in Plantation Forestry Operations April 1993.* This code incorporates a section on application technique which includes aerial application. The code states that it is not possible to set standards (to minimise drift) that will cover all situations. However, the code notes that it is generally recognised that forestry spray operations should stop when weather conditions, as specified in the code, are not suitable. Spray operations should be altered or stopped if unstable air conditions occur, eg fog, inversion layers, valley winds or no wind. Aspects of this code that relate to forestry agrichemical use are to be incorporated in a revision of the *Agrichemical Users Code of Practice.*

The New Zealand Logging Industry Research Association (NZLIRA) has produced the *New Zealand Forest Code of Practice July 1990.* This code covers the harvesting, re-establishment and ongoing management of plantation forests. A section on land preparation includes a brief description of methods of avoiding spray drift from both ground and aerial application of herbicides.

Noxious Plants in Amenity Areas

A code of practice for the use of herbicides in amenity areas was prepared by the Central Auckland District Noxious Plants Authority. It was issued in 1989 and covers the cities in the Auckland region. This code has been considered as the basis for a national standard under the auspices of Standards New Zealand (SNZ). However, there is no funding to finish a national code.

Aerial Operators Codes

The Aviation Industry Association in New Zealand has recently developed a voluntary code of practice for its members. Although it does not mention any means of containing agrichemical sprays to the target property, operators are required to be sure of the area to be treated, the material and application rate required, and the proximity of any susceptible crop or plants before commencing application.

The Aerial Agricultural Association of Australia has developed an accreditation, approval and training programme named 'Operation Spray Safe'. The programme accredits agricultural aircraft operators who own the operations. It approves pilots and a condition of accreditation is that owners must only employ pilots approved under Operation Spray Safe. A training programme for ground support staff,

based on the *Chemical Handling Manual for Agricultural Aviation 1988*, must be in place. The manual for pilots includes information on avoiding contamination of off-target areas as well as other safety and agrichemical application procedures. The Australian code will be considered in the preparation of the aerial application section for the *Agrichemical Users Code of Practice*. A more detailed discussion of these issues and suggestions to the aviation industry are included in addendum A.

Consistency with Standards New Zealand (SNZ) Requirements

Where codes of practice are developed under the auspices of SNZ there are requirements for consultation and community input. A document which only gives recommended work practices without any mandatory requirements would be issued as a guideline rather than as a code. Although compliance with codes of practice is usually voluntary, codes can be made binding through contracts between a contractor and a client, as has been the case in the building industry.

Codes of practice which quote sections of other documents must include provisions for updating as it appears quoting subsequently amended legislation, for example, may render the code *ultra vires*. SNZ has advised the Commissioner that the *Agrichemical Users Code of Practice* requires some revision before SNZ would accept it as a New Zealand standard.

Legal Status of Codes

A code of practice has the ability to set the minimum standards of performance for an activity such as agrichemical spraying. There is evidence that public authorities are already exploring ways to find the most effective way of incorporating a comprehensive code of practice (or part thereof) into a regulatory framework for the purpose of controlling agrichemical spray drift. The options for giving legal status to a code of practice are addressed in addendum B.

Property Protocols

According to growers, the impacts of spraying activities could be minimised through prudent use, the development of a property spray plan or protocol, and regular communication with neighbours on spraying intentions. However, most individual growers rely on informal arrangements.

A large corporate orchardist has formalised the development of spray protocols for each property. This was done partly through self interest, to minimise complaints. The information in each protocol includes:

* a list of the neighbours, and phone numbers;
* any special concerns about spray use;
* notification requirements;
* the spray techniques to be used in each orchard block, such as manning of boundaries, to identify whether any drift or any potential problems off the property are likely;
* specific directions, eg if there is a school on the boundary, it may necessitate incomplete crop coverage;
* times during the day when sprays should not be used, eg when children are travelling to or from school;
* variations to spraying directions on the basis of varying wind conditions.

Accompanying this protocol are detailed job descriptions for each person involved in the spraying operation.

Private growers were aware of the need to consider neighbours and to notify them of their intention to spray. There is a problem of contacting many neighbours, however, when weather conditions are variable. One grower commented that he needed to make roughly 44 phone calls over a period of two to three days before the weather was finally appropriate for his spraying to take place. The growers all accepted that it was incumbent on them to ensure spray did not drift onto neighbouring properties, especially onto houses.

3.5 Contract Operators

Discussions were held with an executive member of the Contractors Federation Rural Section, two members of the Agricultural Branch of the Aviation Industry Association and an executive member of the Pest Control Association.

There are at present two voluntary registration schemes in use for ground spray contractors. One is for contract applicators and grower/farmers applying agrichemicals in agriculture, horticulture, silviculture and amenity areas. The other is for pest control operators. However, any person can set up business as an agrichemical operator without being registered or trained.

Both contractor groups believe the industry and the Pesticides Board need to increase their promotion of the benefits of using only registered operators. Registered ground spray contractors would like to see more 'teeth' in the registration process.

Ground Spray Contractors

The ground spray contractors consider there is a problem in over-spraying (ie excessive application of agrichemicals) which may be solved with skills training. For the separate problem of off-target drift, the contractors consider there is not much research available to mitigate drift hazard from brush weed spraying. They see a need for research into the effects of applying agrichemical sprays in different weather conditions, into how far the sprays might drift, and as to whether some application techniques are more appropriate than others to mitigate off-target drift.

The ground spray contractors see a need for more education of the user in the mechanisms of drift and drift control, for example, the use of an adjuvant, the use of guns rather than booms or rose sprays, the use of nozzles of varying design for different uses (Pearson, 1990) and use of commonsense spraying techniques. There is at present no formal system whereby registered operators can upgrade their knowledge on agrichemical use. Negotiations are in progress for training requirements to be updated and linked to the NZAET Growsafe training programme.

Pest Control Technicians

The Pest Control Association has prepared a code of practice which was accepted by members at the Association's 1993 annual conference. The Occupational Safety and Health Service assisted in the preparation of the code which is based on a United Kingdom example. Currently the Association covers approximately 19% of the operators who are involved in this $14M/year industry*, and it is hoping to involve people working in pest control as an adjunct to commercial cleaning operations.

The Association is planning to develop the practical side of training through the assistance of the New Zealand Qualifications Authority and would like to see a strengthening of requirements for registration and acceptance and implementation of its code of practice.

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* Based on Statistics New Zealand's Annual Business Directory Survey

Aerial Spray Contractors

Aerial application of agrichemicals is perceived as posing the greatest risk to the public and to the environment. The Aviation Industry Association has recognised the need for upgrading their code of practice.

The Aviation Industry Association has joined the NZAET and would like to increase the requirements for registration and institute regular refresher training. Ground staff who prepare the selected agrichemicals for application and load the aircraft are to be included in this programme.

3.6 Manufacturers and Suppliers

Chemical Manufacturers

The prime concerns of the Agricultural Chemical and Animal Remedies Manufacturers Association (AGCARM) are to promote the safe use of agrichemicals and to prevent misuse. Recently agrichemical distributors have joined the Association.

AGCARM is recommending to the distributors that they complete the one day Growsafe training course before completing the 'Distributor Accreditation Course' currently being developed by AGCARM. The accreditation course includes storage and handling of agrichemicals and environmental aspects, such as constuction of bunds, to ensure agrichemicals do not make contact with watercourses. In addition to this user training, many AGCARM member companies run training sessions for both users and distributors on the safe and efficient use of their products.

To reduce off-target spray drift, AGCARM believes that the current legislation should be strengthened to assist in the apprehension and punishment of those few operators who, by misapplication, cause problems. There is a need for heavy financial penalties and the withdrawal of operator's licences for serious offences.

Information transfer is primarily achieved through the label on agrichemical containers. The label information is supplemented by more detailed technical data, eg Material Safety Data Sheets (MSDSs). Some Association member companies supply a summary of environmental and health information on products in a form suited to the general public.

Although it is not a legal requirement, AGCARM supports the completion of spray diaries by all persons who apply agrichemicals. This use of spray diaries would provide a reliable information base for any inquiries regarding the use of agrichemicals.

AGCARM noted that rose sprayers were inappropriate for herbicide use and should be banned for this activity.

Equipment Suppliers

The size of the New Zealand market means there are very few local manufacturers of spray equipment, most of which is imported or assembled from overseas suppliers. The Agricultural Engineering Institute believes suppliers are keen for better standards of equipment but the costs and problems of creating a New Zealand design mark for agrichemical spray equipment make it impractical.

3.7 Summary

The growers, contractors and manufacturers have identified problems with the system for managing off-target spray drift. In some instances industry groups have started to address the issues through, for example, devising a code of practice.

The issues that have been raised as part of this investigation include the need to:

» Reduce the source volume of sprays;

» Reduce the risk to the community;

» Provide training for sales people and operators;

» Improve the dissemination of information and notification of spray events;

» Provide effective sanctions for misuse of agrichemicals; and

» Encourage research into properties and characteristics of spray drift as well as the effects on health.

4.0 Legislation and Public Authority Management

4.1 Introduction

There is no one piece of legislation that sets up a management framework for the control of agrichemical use, including the issue of off-target spray drift. Legislation with relevance to the issue includes:

* the Pesticides Act 1979 and regulations,
* the Health Act 1956,
* the Civil Aviation Act 1990 and regulations, and
* the Resource Management Act 1991.

As well as the legislative framework for the management of agrichemicals, central government has addressed the use of agrichemicals through the Pesticides Technical Task Group and herbicide damage problems through the Pesticides Board Working Party in 1985/6.

Changes to legislation are pending with the preparation of the Hazardous Substances and New Organisms Bill and the related Agricultural Compounds Bill (see addendum B).

4.2 Pesticides Act 1979

The Pesticides Act 1979 provides for the regulation and control of the sale and use of pesticides. The Act, administered by the Ministry of Agriculture and Fisheries, makes provision for the Pesticides Board whose general role is to promote the safe use of pesticides. The Pesticides Regulations 1983 detail the controls on the use of pesticides.

The pattern of use of a pesticide (agrichemical) is at a grower's discretion, although section 38(11) of the Pesticides Act makes it an offence to use or apply a pesticide otherwise than in compliance with any mandatory directions on the label. There is not an enforceable legal requirement for compliance with label directions unless they are specified as mandatory. Although the registration of a pesticide can be refused or revoked on grounds, *inter alia*, of likely prejudice to health and safety of humans or stock, likely detriment to meat or dairy product, or substantial environmental effects, property damage is the only damage currently recognised in law. For the purpose of a prosecution, Regulation 10, Pesticides Regulations 1983 makes damage to property from the use of herbicides a strict liability offence. However, if a defendant proves that, in applying the herbicide, the

defendant took all reasonable steps to prevent damage resulting to the relevant property, that is a defence to a charge. Offences against the Act or Regulations places on the prosecution the criminal onus of proof, 'beyond reasonable doubt'.

In order to pursue a prosecution, MAF must be reasonably sure that the level of proof is sufficient to meet that test. It appears this level of proof is not readily obtained because of the inability to:

a. identify the offender positively (adjoining farmers may act together and spray simultaneously, thus obscuring who may be responsible for any damage);
b. confirm cause of damage; and
c. disprove (where a defence is raised) a defendant's claim to have taken all reasonable steps to prevent the damage that occurred.

A property owner may sue for negligence in a civil action where damage has occurred. This requires the same sampling and testing procedures to identify the cause, but the onus of proof is a lesser standard than that required for a criminal prosecution.

Pesticides Board Working Parties

In 1985 the Pesticides Board convened a Working Party to examine the issue of herbicide damage. A report to the Board made a number of recommendations, eg encouraging farmers to use herbicides in the April - September period (when damage to at-risk outdoor crops such as grapes is less likely), activities by the Board to increase education and awareness, and an amendment to the legislation removing the 'reckless use' provision of the Pesticides Regulations 1983. That amendment resulted in the inclusion of Regulation 10 which makes damage to property from the use of herbicides a liability offence.

Since the Working Party reported in 1986, the issue of agrichemical off-site spray drift has continued. In October 1993, the Pesticides Board established a Spray Drift Working Group, drawing participants from all stakeholder groups to coordinate initiatives being taken and to recommend further actions the Board could take.

4.3 Health Act 1956

Local authorities have responsibilities under section 23 of the Health Act 1956 to promote and conserve the public health within their district by, *inter alia*, making regular inspections to ascertain if any nuisances, or any conditions likely to be injurious to health or offensive, exist in a district. The existence of off-target spray drift in some situations could be regarded as likely to be or to cause a nuisance.

Section 60 of the Health Act 1956 provides that it is an offence to cause directly or indirectly the pollution of a public water supply in

such a manner as to make the water dangerous to health, or offensive, or unfit for domestic use. It is similarly an offence to pollute any watercourse which passes through a borough, town, urban area or community whether or not the watercourse is part of the local water supply, unless it can be proved by the defendant that no danger to health arose from the pollution and that it was not offensive. However, pollution of private water supplies by agrichemical spray drift is not an offence under this legislation.

Section 29 of the Health Act 1956 specifies the circumstances in which activities can be regarded as a nuisance, namely when they are "likely to be injurious to health". District Court action to abate a nuisance is authorised by sections 32-35 of the Act.

Section 74 of the Health Act 1956 requires medical practitioners to notify the Medical Officer of Health of cases of listed notifiable diseases and, thereafter, the Public Health Commission must be informed. Section B of the Second Schedule of the Act includes poisoning arising from chemical contamination of the environment as a notifiable disease.

Changes in health administration were made on 1 July 1993 with the formation of the Ministry of Health, the Public Health Commission, the four Regional Health Authorities and the Crown Health Enterprises. The functions of the former Department of Health under section 7(d) (now repealed) to promote or carry out research and investigations in relation to matters concerning the public health and the prevention or treatment of disease have been removed by the Health Amendment Act 1993. It is not clear whether any health agency has been given these functions. The function of encouraging health research initiatives and supporting such research is vested solely in the Health Research Council.

4.4 Civil Aviation Act 1990

The Civil Aviation Act 1990 and the Regulations made pursuant to it establish rules of operation for the civil aviation system in order to promote aviation safety.

To apply agrichemicals from the air for reward a pilot must have a commercial pilot's licence, an agricultural rating and a chemical rating. Knowledge of spray drift relating to distances and maximum winds, health aspects of agrichemicals and further practical supervised work experience is required to obtain a chemical rating. In addition, the aerial work company has to have an aerial work certificate.

Regulation 32(2) of the Civil Aviation Regulations 1953 provides that the dropping of agrichemicals where the pilot in command holds a chemical rating is an exception to the prohibition on dropping things

from aircraft in flight. No person shall, however, wilfully or negligently drop from an aircraft in flight anything in a manner that creates a hazard to persons or property below the aircraft.

The Regulations do not cover restrictions on the type of chemical that may be sprayed from an aircraft. Moreover, there do not appear to be any specific sanctions in the legislation relating to a pilot who does create a hazard by a spraying operation, although there is a wide offence provision against any person operating under a civil aviation licence who causes "unnecessary danger to any other person or to any property". The sanctions of imprisonment and of fines, as well as disqualification, are available (ss 43,45,47).

4.5 Resource Management Act 1991

Under the Resource Management Act 1991 the environmental effects of activities such as off-target agrichemical spray drift can be addressed. The purpose of the Act, as outlined in section 5, is to promote the sustainable management of natural and physical resources.

Under section 43 of the Act, central government can assist local government by developing national standards for air quality. A *National Guideline for Air Quality* has been developed but does not contain guidance on spray drift as an air pollutant.

Regional councils are required to develop a regional policy statement (RPS) which provides an overall framework for the management of the natural and physical resources of that region (s60). Regional councils may also develop regional plans for resources such as air quality (ss 30,65). Functions of a regional council include the control of the use of land for the purpose of the prevention or mitigation of any adverse effects of, *inter alia*, the use of hazardous substances (s30), although the Act does not define hazardous substances.

The discharge of contaminants into air, although a matter which could require a consent from a regional council, is not required for farming or horticultural land, since the restriction of section 15(1) relating to aerial discharges is confined to discharges from industrial or trade premises. Otherwise the controls on aerial discharges must be imposed by rules in the regional plan. Regional councils may be able to use the general duty (s17) on every person to avoid, remedy or mitigate any adverse effect on the environment arising from an activity such as off-target agrichemical spraying. Though that duty is not of itself enforceable (s17[2]), there are circumstances when enforcement or abatement proceedings may be taken.

District councils must develop district plans to assist them to carry out their functions. The functions of these territorial authorities include

the control of any actual or potential effects of the use, development or protection of land and the control of subdivision of land.

4.6 Regional Councils

Several regional councils have produced discussion documents or 'Issues and Options' papers on air quality in the course of preparation of their RPS or a more detailed regional air quality plan. In many instances, the impact of spray drift has been identified as a major air quality issue, eg in the Bay of Plenty, particularly where residential or rural-residential areas have developed in close proximity to existing farming or horticultural areas. Regional council staff view the air quality plans as one of the ways in which spray drift could be managed. Rules within an air quality plan could be promulgated to manage off-target drift.

A recent initiative in the Bay of Plenty region is to develop property environmental plans. Although details have to be worked out, the idea is to draw up a plan for an individual property which could include such matters as codes of practice for spraying.

4.7 District Councils

Many district councils are preparing new district plans to replace the transitional district plans which are currently in place. The rules promulgated under these district plans could include rules to control the environmental effects of off-target spray drift. The extent to which such rules could lead to the minimisation of off-site effects is uncertain at present. There is a danger that such rules could be costly to enforce and that monitoring for compliance may be impractical given normal farming practices. Practices involving the use of agrichemicals may be protected as existing land uses (s10, Resource Management Act 1991), although where spraying is regarded as an aerial discharge under section 15(2) the existing use rights are very limited (s20).

District councils are also responsible for the control of subdivision of land within their district. In rural districts, the way in which residential or rural-residential subdivisions are created is crucial to the management of agrichemical spray drift. In the Western Bay of Plenty District Council, for example, rules on subdivision were changed in 1992 to allow a variety of subdivision options. It is not clear yet whether this flexibility would help or hinder any future land use incompatibilities with respect to agrichemical spray drift.

The Christchurch City Council is using a tiered approach based on the particular effects of activities to determine whether and what form of resource consent may be required for land uses in the rural area of the city. The Council is considering rules dealing with both subdivision (minimum lot size in different rural zones) and the containment of spray drift, so as to secure adequate separation and/or control of the application of potentially hazardous substances from the normal range of rural activities. The Council is also considering the merits of a 'cascade model' in which increasing the intensity of an activity in an area may change the activity from being permitted to being a controlled/discretionary or a noncomplying activity, with a corresponding need for further assessment and consents.

The Tauranga District Council has a policy of following up complaints of spray drift onto adjacent land uses with monitoring of the situation. Monitoring has been carried out in the past by staff from the Agricultural Engineering Institute and the former Area Health Board to ascertain how much spray has drifted on to adjoining properties and the likely effect of such spraying on the neighbours.

This Council has decided to include information on the likelihood of agrichemical spray activity on adjoining properties when supplying a Land Information Memorandum (LIM) as provided for under section 44A of the Local Government Official Information and Meetings Act 1987, or a Project Information Memorandum under section 31 of the Building Act 1991. This information, based on staff local knowledge, is intended to alert enquirers to the potential effects of nearby activities on land which they may be interested in purchasing.

4.8 Public Health Commission

The Health and Disability Services Act 1993 requires the Public Health Commission (PHC) to advise the Minister of Health on matters related to public health. Other functions of the Public Health Commission include monitoring the state of the public health, identifying public health needs, and purchasing public health services.

The Commission has provided policy advice to Government on hazardous substances, focussing on the reduction and prevention of adverse health impacts and minimising public health risks from, *inter alia*, involuntary exposure to agricultural chemicals.

Once decisions are made by the Minister as to the outputs required, the PHC will purchase, either directly or through regional health authorities, programmes related to the public health aspects of hazardous substances.

4.9 Ministry of Education

A complaint was made to the Commissioner about the use of pesticides within school buildings at a particular school. Information was obtained from the former Department of Education on its policy for the use of toxic substances in school grounds. The policy states that strict adherence to labelling instructions for storage, handling and use is required and that such substances should be used preferably by registered operators. There did not appear to be any policy covering the use of hazardous substances in school buildings. A *Health and Safety Code of Practice for State, Primary, Composite and Secondary Schools* has been prepared but does not make any reference to the use of hazardous substances, such as agrichemicals, within the school grounds or within school buildings. The Ministry of Education has informed the Commissioner that there is no intention to issue a code of practice for agrichemical spraying within school grounds.

The school which was the subject of the complaint has made a policy that spraying of school grounds is to be carried out during weekend or holiday periods, if possible, and that any spraying is done with a full day between application and occupation of the school.

There are situations where schools are located adjacent to orchards and parents have expressed concern about spray drift affecting their children. The Medical Officer of Health, Takapuna, requested an investigation at the Henderson Valley Primary School (Graham and Steinmeyer, 1985). The potential for indirect exposure to agrichemicals after spraying in the orchard was found to be within Ministry of Health suggested guidelines. A recommendation that spraying of that part of the orchard closest to the school be restricted to outside of school hours was made. The practice had been adopted for the 1984/85 spraying season without causing difficulty to the orchardist. Similar situations have also been investigated at Te Horo (Brown and Hodgkinson, 1986) and at Mangamahu (Ferguson, 1987). Although it was concluded that exposure to agrichemicals should not cause a potential health hazard, recommendations to minimise exposure were made.

4.10 Occupational Safety and Health Service (OSH)

Administration of the Health and Safety in Employment Act 1992 is the responsibility of the Department of Labour Occupational Safety and Health Service. The objective of this Act is to prevent harm to employees at work. The Act imposes duties and responsibilites on people to manage hazards correctly to provide a safe and healthy work environment; for example, exposure of an employee while mixing agrichemical concentrate should be minimised. Employers and others are expected to ensure that actions at work do not result in harm to other people, including members of the public. An assessment of likely hazards for the employee should assist in identifying hazards for the public. In this process the term 'all practicable steps' is used to import a measure of practicality into the assessment procedures.

The Occupational Safety and Health Service is currently undertaking some investigative work developing strategies on the safe use of agrichemicals. A brief national survey on health issues for rural seasonal workers is being carried out in the 1993/94 year to assess the level of occupational health and safety knowledge of employers.

4.11 National Poisons and Hazardous Chemicals Information Centre (NPHCIC)

The National Toxicology Group within the University of Otago Medical School comprises the National Poisons and Hazardous Chemicals Information Centre (NPHCIC), the National Medicines Adverse Reaction Monitoring Centre and the Intensive Medicines Monitoring Programme.

The NPHCIC holds details of toxic and hazardous substances including those that are registered under various Acts in New Zealand. This information is supplied either by government agencies or on a voluntary basis by manufacturers and distributors. The Centre holds World Health Organisation (WHO) environmental health information and can give advice on animal poisoning.

The primary purpose of the Centre is to give emergency advice on the management of poisoning events and chemical emergencies. In the 1991/92 year the NPHCIC received 7390 telephone calls with 85% related to poisoning incidents (half the calls were from members of the public and half were from health professionals). About 16% of all calls were about agricultural chemicals. In addition to the emergency service, general enquiries concerning potential toxic effects of chemicals encountered in the occupational and other settings are answered from the computerised data base and other available literature sources. Spraying of school grounds was a major public concern identified by the NPHCIC staff.

The Centre collects basic information on chemicals and some case histories of exposures to agrichemicals. Poisoning exposure data are incomplete and current data collection is inconsistent, eg, organophosphates exposure is a notifiable disease but only in the workplace.

There are some anomalies with respect to the information the NPHCIC receives. For example, some imported chemical formulations, if not notified to Government agencies, would not be captured by the NPHCIC.

The Centre's relationship to the proposed Environmental Risk Management Authority (ERMA), created under the HSNO legislation, is uncertain. There is a possibility that the Centre's data base could be extended and integrated with an information data base that ERMA will need to develop.

5.0 Recommendations

Part I IMPROVING THE GOVERNMENT SYSTEM

The present legislation is not able to manage off-target spray drift comprehensively as the controls are scattered through different pieces of legislation. There is a clearly identified need to consolidate and simplify legislative provisions.

There are two aspects that need to be addressed. One is the need to manage risk. This is a central government responsibility. The second is the management of the off-target effects in a more integrated manner. This is a local government responsibility.

The key to improving the management of agrichemical spraying so as to prevent or mitigate adverse effects arising from the activity is through a double-pronged approach: legislative reform which will enable central government agencies and local authorities to operate more effectively.

5.1 Control of Use

Central Government

The proposed HSNO legislation should be the vehicle to give a clearer legislative framework to manage spray drift. This could be achieved by including provisions to control the safe use of agrichemicals. The sanctions should be linked to the enforcement, offence and penalty provisions of the Resource Management Act 1991.

RECOMMENDATION 1

THAT the Minister for the Environment ensure that the proposed HSNO legislation includes controls on the **safe use** of hazardous substances in agriculture by:

» Establishing a compulsory system of registration and training for both ground and aerial commercial agrichemical operators. Continuation of registration should be dependent on a five yearly review and upgrading of the operator's training;

» Ensuring that aerial operators obtain their chemical rating through the proposed ERMA;

» Assuming responsibility to register agrichemicals;

» Ensuring that provision is made for the promulgation of performance and maintenance standards for equipment used in the application of agrichemicals, including banning the use of inappropriate equipment;

» Allowing for the recognition of industry developed codes of practice which include acceptable standards for agrichemical spraying operations;

» Providing sanctions in legislation that are sufficient to deter operators from failing to conform with codes of practice when using agrichemicals, eg forfeiture of licence if off-site effects can be proven.

5.2 Compliance Monitoring

There are other matters that could be addressed through the HSNO legislation. The present system only allows for assessment of non-compliance where there is plant damage but not other aspects of environmental damage or harm, and there are problems in collecting evidence under the present legislation. It would be useful if records of noncompliance were to be kept by prosecuting authorities and if guidelines with appropriate monitoring standards were provided.

RECOMMENDATION 2

THAT the Minister for the Environment require the proposed ERMA to:

» Develop a coordinated framework of monitoring guidelines and standards within which agencies shall investigate complaints about compliance where misuse of agrichemicals is alleged;

» Require authorities to keep records of damage incidents so that operators' performance can be checked before renewal of registration.

5.3 Legislative Consistency

If agrichemicals not classified as toxic or hazardous under the HSNO legislation are dealt with under the proposed Agricultural Compounds reform, there is potential for fragmentation of the controls on agrichemicals. Consistency in the legislation governing the use of agrichemicals is essential. Separation of administration may add to the confusion that already exists in this area. The scientific support for both agrichemicals and animal remedies assessment should be retained in such a way as to ensure a coherent approach to agrichemical control.

RECOMMENDATION 3

THAT the Minister of Agriculture and the Minister for the Environment:

» Review the necessity to separate the administration of hazardous agrichemicals from that of agricultural compounds;

» If some agrichemicals are to be administered under the proposed Agricultural Compounds legislation, the performance requirements relating to the use of these agrichemicals should be consistent with requirements for hazardous agrichemicals under the HSNO legislation;

» Review the roles and functions of the Pesticides Board, the Animal Remedies Board and the Agricultural Compounds Unit in light of proposals for ERMA.

5.4 'Lead Agency'

Local Authorities

Local authorities have the primary responsibility to take preventive measures to mitigate the effects of off-target spray drift.

There is some public confusion as to which government authority has overall responsibility for managing off-target spray drift. The confusion is understandable, given that regulatory control is divided among at least three public authorities.

Improvement could be achieved if, by delegation under the HSNO legislation, the regional council in each region were to be the 'lead agency' to which the public could apply for advice or which could investigate complaints of off-target spray drift. The statutory responsibilities of regional councils makes them well-placed to take the role of a 'lead agency'. In such a regime, the 'lead agency' would have responsibility for investigating complaints and would coordinate the other agencies that, in any given case, may need to be involved, namely ERMA and any of the stakeholders identified in chapter 1.

RECOMMENDATION 4

THAT regional councils:

» Be the 'lead agency';

» Identify areas of high risk where off-target spray drift may affect humans, crops, water supplies or other sensitive environments;

» Prepare air quality plans for regions where the impacts of agrichemical use have potential for significant adverse health and/ or environmental effects;

» Consider adopting the relevant parts of industry developed codes of practice by way of rules in regional plans or through the resource consent regime;

» Consider restricting the use of plant growth regulator herbicides to periods of the year when specified 'at-risk' crops are less vulnerable;

» Consider a requirement that alternative sprays which are less hazardous be used in sensitive or risky locations;

» Consider creating zones in which specified agrichemicals shall not be used.

5.5 Land Use Restrictions

There are land use planning measures that district councils can take to prevent or mitigate off-target spray drift problems. These include providing for buffer zones, although there is a risk that the creation of buffer zones may encourage a false sense of security, that spraying is safe up to the boundary of the buffer zone.

District council environmental health officers have a role to play in examining whether off-target spray drift could be causing a public nuisance.

RECOMMENDATION 5

THAT territorial authorities should consider using the following:

» Making it a condition of approval for noncomplying rural-residential subdivisions in areas where intensive horticulture has been established that provision is made for measures such as the following:

buffer zones,

shelter belt establishment on boundaries adjacent to other rural land where agrichemical sprays will be used,

information on adjacent land uses to prospective land purchasers;

» Ensuring district plans allow flexibility in block size within rural-residential subdivisions so that larger blocks are adjacent to any existing intensive horticulture or other rural activity which may include agrichemical spraying;

» Promulgating district rules so that the building line for dwellings in such rural areas should be sited an appropriate distance from a neighbouring boundary;

» Instituting a staff reporting requirement to council in terms of section 23(b) of the Health Act 1956 with regard to the potential for nuisance to arise from the off-target drift of agrichemical sprays;

» Developing and using a code of practice to minimise the impact on adjoining properties of council-initiated agrichemical spraying activities.

5.6 Information on Land Use Changes

The use of a Land Information Memorandum or a Project Information Memorandum may be adapted, as one district council has done, to inform intending subdividers and intending residents in a rural-residential area that there are commercial crops in the area which may be sprayed to meet export or domestic market requirements.

RECOMMENDATION 6

THAT territorial authorities:

» Develop and regularly update a geographical register of the activities in their location so that information on the potential effects of existing land uses (eg, agrichemical applications) on new land uses and vice versa is available when a Land Information Memorandum or Project Information Memorandum is requested by the public.

Part II MINIMISING THE RISK

Introduction

On the basis of public and grower concerns, a number of improvements to the system for minimising spray drift onto non-target areas are proposed. These improvements are discussed in terms of:

* reducing source volumes of agrichemicals used;
* reducing risks associated with agrichemical spraying;
* improving communication between agrichemical users and the public; and
* improving public authority performance.

Suggestions to growers and industry on measures to improve their use of agrichemicals are contained in addendum A.

5.7 Reduction of Source Volumes

A reduction of source volumes of agrichemical spray used has the ability to reduce off-target spray drift and may be achieved in several ways.

In the first instance, the requirement of countries importing our produce that pests of perceived risk to their countries are not present in our exports (achieved through the use of various agrichemical sprays) should be constantly challenged and less stringent standards negotiated if possible.

RECOMMENDATION 7

THAT the Minister of Agriculture continues to press within Codex and the General Agreement on Tariffs and Trade (GATT) for the international harmonisation of phytosanitary requirements so that the volumes and use of agrichemical sprays may be reduced.

5.8 Reduction of Risk

Reducing off-target risk by the efficient placement of the spray is best achieved by operators who are knowledgeable and abide by a code of practice.

Codes of Practice

Different industry groups have over recent years developed codes of practice to cover aspects of agrichemical use, including measures to minimise off-target spray drift, and many are under review at present. The Agrichemical Education Trust and other industry groups are to be commended for the development of these codes and the associated training programmes. These codes should be easy to read, and able to be approved as a New Zealand standard. They should also be drafted in such a way that their standards and terms may be adopted either as rules in plans (subject to the procedural requirements of that process) or as conditions attached to resource consents for discharge activities.

When revising the *New Zealand Agrichemical Users Code of Practice* the New Zealand Agrichemical Education Trust (NZAET) should:

* allow for regular updating;
* include a requirement for a property protocol which identifies susceptible crops or animals in the vicinity and neighbours sensitive to the use of agrichemicals;
* include a requirement that there be procedures for notifying agrichemical spray intentions; and
* include a requirement for agrichemical users to upgrade their knowledge and skills on a regular basis.

In revising their code of practice, the Aviation Industry Association, in association with the NZAET, should include the following aspects:

* identifying target paddocks, streams and boundaries;
* assessing wind direction and speed;
* ensuring spray cut off;
* height of spray release;
* location of spraying operation;
* qualification/training of ground support crew.

Details of these requirements are included in addendum A.

Risks to school children

Schools need to consider their responsibilities not only to their pupils but to near neighbours when agrichemicals are used in the school grounds and buildings. Schools may need to consider the potential risk from neighbouring activities and put in place measures to minimise exposure to off-target drift.

RECOMMENDATION 8

THAT the Minister of Education:

» Promulgate a policy to provide for the protection of children in schools from spraying operations within school property and from spray drift arising from spraying operations outside the school property;

» Require Boards of Trustees to prepare a protocol at schools using agrichemicals in the school grounds and/or buildings in order to minimise on-site and off-site risks from agrichemical use.

5.9 Communication and Information

Product Information

A community concern is the lack of knowledge of the nature of various sprays required to be used on commercial crops. The agrichemical manufacturers have information on the toxicity, rate of degradation of products and any potential health and environment effects, but this information does not seem to be readily available to interested or potentially affected people.

At present information on agrichemicals is available in a variety of technical forms. The Pesticides Board could specify the format and content of a general product information sheet for the public, covering environmental, safety and health aspects to be provided by the New Zealand importers or manufacturers.

Such information sheets could be required as part of the agrichemical registration process. They could be available from local authorities, MAF offices and other appropriate sources as well as being supplied to the National Poisons and Hazardous Chemicals Information Centre. Currently it is not obligatory for manufacturers to provide information on their products to the Centre.

RECOMMENDATION 9

THAT the Pesticides Board (or its successor), in conjunction with the National Poisons and Hazardous Chemicals Information Centre:

» Provide format and content guidelines for a general product information sheet covering environmental, safety and health aspects that agrichemical importers/manufacturers are to provide for the public;

» Require that a general product information sheet for public use, complying with the guidelines provided by the Board, be included with the application for registration of an agrichemical.

Public Information

The National Poisons and Hazardous Chemicals Information Centre in Dunedin receives many calls from people worried about the effect that certain sprays might have on at-risk groups such as children and pregnant women. The roles of the proposed ERMA and the National Poisons and Hazardous Chemicals Information Centre in Dunedin need to be integrated to ensure that a comprehensive information source is available for people with health or environmental concerns about agrichemicals.

RECOMMENDATION 10

THAT the Minister for the Environment provide for integration of the proposed ERMA information data base and the National Poisons and Hazardous Chemicals Information Centre data base on environmental and health effects of chemicals, including agrichemicals.

Health Effects

There is strong community feeling in many regions of New Zealand that, regardless of the assurances given by health authorities, exposure to pesticides may well have long-term health effects.

Most of the studies investigating long-term health problems have concentrated on occupational exposure to agrichemicals. Failure to detect a significant association between exposure to agrichemicals and long-term health effects in the few community health studies carried out does not necessarily eliminate the possibility of problems being identified in the future. There is a need for ongoing surveillance and assessment of human health risks arising from significant exposure to agrichemicals.

There also needs to be a process which ensures that information on health issues and adverse incidents is reported back to the Pesticides Board or the proposed ERMA, thereby enabling amendment of the label and/or registration of an agrichemical if appropriate. This information also needs to be fed back to the health providers to support their assessment of their patients' conditions.

RECOMMENDATION 11

THAT the Minister for the Environment enable the proposed ERMA to require the relevant agencies to provide information on environmental and health effects arising from the use of hazardous substances in agriculture where reassessment of effects is shown to be necessary on the basis of criteria developed by ERMA.

Public Health Monitoring

As well as exposure assessments, ways of measuring dose and effects are needed. With the exception of the test for organophosphate poisoning, there is a lack of scientifically replicable tests for measuring agrichemical levels in people at the time of their alleged contact.

The Public Health Commission, which has functions to monitor and identify public health needs, has an opportunity to promote a better understanding of the adverse health effects which may be associated with agrichemical spraying.

RECOMMENDATION 12

THAT the Public Health Commission ensure that the public health service has the ability to test clinically for agrichemical exposure of people.

Adverse Incidents Register

The establishment of an Adverse Incidents Register, to cover public health and environmental effects arising from pesticide use, and a consistent reporting framework will materially assist identification of any health effects. Such a register could include the data on poisoning surveillance collected by the NPHCIC.

RECOMMENDATION 13

THAT the Minister of Health direct the Public Health Commission to establish an Adverse Incidents Register to record any adverse effects on health, including public health, arising from agrichemical use.

Notification of Operations

Informing neighbours of spraying operations is highly desirable although, in practice, somewhat difficult. However, where neighbours specifically request prior notification of spraying, growers should endeavour to meet this request. Prior notification to schools of spraying operations should be required and schools themselves should have a responsibility to advise neighbours, pupils and their parents of the use of agrichemicals within the school grounds.

Grower organisations could take more responsibility to assist growers to develop practical means of communication, including the use of community radio to advise of intended spraying activities in certain districts.

5.10 Research

Some research into the effects of agrichemical sprays has been carried out by the Forest Research Institute, Horticultural Research and the Agricultural Engineering Institute (AEI) at Ruakura. There has been some research work done in New Zealand on agrichemical drift from orchard situations and more work is planned for the near future. The AEI is studying the performance of shelter belts in reducing off-target spray drift.

The AEI is also looking at the performance of spray equipment over time. This study may provide the information needed on the maintenance requirements of such equipment.

Because of concern for drift of vapour as identified by agrichemical odour some distance from the application site more research is needed to establish a relationship between 'smell' and the concentration of a potentially harmful ingredient.

Fruit growers in some markets will have to use alternative pest control measures, such as Integrated Pest Management, which will help reduce agrichemical usage. (New Zealand has to meet strict requirements for the maximum residue levels [MRLs] of agrichemicals remaining at the time of harvest.) Research on improving the effectiveness of Integrated Pest Management (IPM) techniques is essential.

The following aspects are identified as needing research. Items A and B would be of benefit to the horticultural, agricultural and forestry industries; item C is an area of national interest which could be funded by the Foundation for Research Science and Technology (FORST). Research on health effects identified in items D and E could be funded by FORST under Science Area 37 and/or the Health Research Council could promote and support this research.

RECOMMENDATION 14

RECOMMENDED RESEARCH AREAS:

A Integrated Pest Management techniques

B The relationship between shelter belts and crop performance and associated management parameters including containment of agrichemical spray drift by different shelter belt species.

C The relationship between 'smell' of agrichemicals and the concentration of active ingredient associated with the smell and its ability to cause harm.

D The relationship between pesticide use or exposure and effects on human health, short and long-term.

E Establishment of a clinical technique to detect the presence of agrichemicals in humans within a few hours of exposure.

Addendum A: Advice to Agrichemical Users and Manufacturers

Aerial Operators

The Aviation Industry Association, Agricultural Division, should include standard operating procedures in their code of practice to apply to both fixed wing and helicopter operators for the following:

1 Identification of target paddocks, streams and boundaries

A positive means of identifying the paddock to be sprayed or areas to be avoided is one way of minimising off-target spray drift. Identification should be confirmed by either fixed or mobile markers. It would be important to mark the boundaries of a stream if it is in the near vicinity of a spraying operation. The rule should be 'No identification, no spraying'. The installation of sophisticated location systems in aircraft used for agrichemical application may become more common in the future, thus improving the accuracy of spray site identification and application.

2 Assessing wind direction and speed

As discussed in chapter 3, some wind is desirable for spraying operations. Misjudgment of wind speed and direction is clearly a potential cause of off-target spray drift. It is essential that an aerial operator assess the wind at the place of spraying before commencing operations. Smoke sources either on the ground or in the aircraft and 'banners' or long thin strips of light material mounted on poles can assist in this assessment. Aids such as these should become more regularly used features of the management of off-target spray drift.

Where the spray site is some distance from the aircraft loading area it would be useful to provide some guidance to the property owner or manager on how to assess wind speed and atmospheric conditions. The farmer or grower's perception of conditions in which it is safe to spray and the pilot's assessment may vary considerably. A pilot arriving at the site with a loaded aircraft on the basis of the farmer or grower's advice that conditions are satisfactory will be under considerable pressure to carry out the application even if conditions are not satisfactory.

3 Ensuring spray cut-off

Appropriate equipment is essential to ensure the spray equipment stops when the pilot operates the cut off, otherwise spraying of non-target areas is highly likely.

4 Height of spray release

Spray release height depends both on general constraints of meterological conditions, atmospheric stability, the terrain and the type of aircraft. The code could specify the maximum distance above the ground or tree top level that spray could be discharged.

5 Location of spraying operation

Crop placement in relation to constraints is a major factor in determining risks of off-target spray drift. Constraints relate not only to trees and power lines but also to occupied dwellings, open water, public roads, stock in adjacent paddocks, people in the vicinity and adjacent crops which may be susceptible to contamination. Planning the location of crops in relation to spray requirements is one of the most important means of avoidance of off-target spray drift incidents. A code of practice should detail the situations where aerial spraying is inappropriate because of the high risk of off-site effects. This information also needs to be provided to land owners.

6 Qualification/training of ground support crew

Ground support crew should be qualified, particularly in terms of agrichemical knowledge, equipment calibration, mixing experience, safe handling and disposal of containers and surplus spray.

The industry should also address the provision of holding tanks for prepared sprays which may be unable to be used immediately because of a change in weather conditions, for example.

Growers and Producers

Property owners and managers can reduce the potential for off-target drift if they reduce the total quantity of agrichemical spray applied. This may be achieved through reducing the frequency of application by monitoring of pest levels within the orchard and/or the use of information from data modelling of pest incidence to define times for strategic agrichemical application.

Growers' organisations and producer boards should continue to foster the concept of good husbandry and crop and shelter hygiene and encourage growers to seek up-to-date advice on techniques to minimise the necessity for agrichemical use to meet quality standards and/or export phytosanitary requirements.

The quantity of agrichemical may be reduced by using efficient, well-maintained equipment operated by trained and competent operators. Some guidance to growers and contractors is needed to indicate what equipment is appropriate for different spray situations and what equipment is appropriate where there is a high risk of spray drift affecting sensitive non-target areas.

Land owners or managers with activities perceived to be at risk from neighbouring agrichemical use activities and those who desire to use agrichemicals should consider the use of live shelter belts as a form of physical barrier to the potential risk of off-target spray drift and the use of buffer strips between the potential source of risk and susceptible crops or activities.

Where grape growing or small-scale organic farming is in an area of pastoral farming, the potential for damage to grapes or disruption to organic growing systems from sprays used for noxious plant control is very high. Shelter belts are not recommended for grapes. These kinds of circumstances require an acknowledgement by landowners of the potential for adverse environmental effects and an accommodation of the needs of each landowner.

A knowledgeable community is seen as one way of helping relieve concern about the use of agrichemicals. Therefore, AGCARM could produce product information sheets including environmental and public health information which should be available to growers and farmers to pass on to neighbours and others concerned about agrichemical use. If neighbours were aware of the frequency of spraying activities they could take whatever precautions they deemed appropriate.

Because of the vagaries of weather and the number of neighbours, alerting them to intended spraying actions can be quite time consuming. Therefore, the various grower organisations could request their district branches to liaise with growers and devise a strategy for informing the public of agrichemical spray intentions within a district.

The strategy should use known practical means of communication which identify contacts for the public. The grower associations could assist by developing form letters for growers to use. Community radio could also be used by grower associations to inform people within a part of a district that spraying was likely to occur over the next few days.

New Zealand Agrichemical Education Trust

The initiative of the NZAET in developing a code of practice for agrichemical use is to be commended.

Information on minimising the quantity of spray used by ensuring the right equipment is set up for the conditions and is adequately maintained is needed. Since this information is not readily available, the NZAET could, in conjunction with the Agricultural Engineering Institute and equipment suppliers, develop guidelines on the appropriateness of various forms of equipment and the settings and adjustments necessary for various spray situations. Any variation in settings and adjustments which should be made where there is a high risk of spray drift affecting sensitive off-target areas should also be included.

The operator industry associations should also take up the challenge and make this information available to their members.

A comparison with the British *Pesticides Code of Practice* (Ministry of Agriculture, Fisheries and Food, 1990) indicates the British code has used language and structure that is easier to read than the New Zealand code. In revising the New Zealand code, a more narrative style of presentation could be considered. Codes should also be drafted in such a way that their standards and terms may be adopted either as rules in plans (subject to the procedural requirements of that process) or as conditions attached to resource consents for discharge activites. Details of property protocols required by a code of practice were discussed in section 3.4.

When revising the *Agrichemical Users Code of Practice*, the New Zealand Agrichemical Education Trust could:

* Consider a more narrative style of presentation with an easy readability rating - a user friendly language structure;
* Ensure that the resulting code can be accepted as a SNZ standard;
* Ensure there is provision for regular updating, particularly when related legislation is amended;

* Ensure the code makes provision for the preparation of a property protocol which:
  (i) includes the identification of susceptible crops or animals in the vicinity and neighbours sensitive to the use of pesticides,
  (ii) identifies the priority contacts to be informed and the notification procedures of agrichemical spray intentions, eg schools, susceptible neighbours, glass house growers, especially if using hormone herbicides;
* Ensure that the code of practice places an onus on agrichemical users to upgrade their knowledge and skills on a regular basis.

Sanctions against commercial operators, such as requiring retraining and loss of registration, may be applied but sanctions against growers are more difficult. Failure to comply with a code of practice may require all growers to become registered operators. Compliance with a code of practice should be required of all users of agrichemicals and the history of a user's compliance (or otherwise) could be used as evidence in any proceedings brought against a grower.

Agricultural Chemicals and Animal Remedies Manufacturers Association (AGCARM)

Contractors often do not go back to a site after they have sprayed to see the effect the spraying has had in terms of the potential drift hazard and the damage that might have occurred.

AGCARM could prepare displays for field days demonstrating the extent of off-target spray drift under a number of different application situations.

A concern expressed in some communities was the lack of easily understood and readily available information on agrichemicals, including any environmental and health effects arising from their use. One way of overcoming this information gap would be for the agrichemical manufacturing industry to prepare this information in an easily readable form and make it available for distribution by public authorities, distributors and the users of agrichemicals.

AGCARM could advise its members to prepare general product information sheets, for existing products, which comply with the guidelines that could be provided by the Pesticides Board covering environmental safety and health issues, and make these available for distribution to the public from local authority and retail outlets.

Addendum B:
A New Regulatory Regime

Hazardous Substances Legislation

Hazardous substances legislation covering risks to public health and the environment, together with the regulation of new organisms, is currently being developed. The Hazardous Substances and New Organisms (HSNO) legislation is expected to be introduced into the House in 1994.

The reform of the management system of hazardous substances has the objective of ensuring a consistent and coordinated approach to the reduction of the risk of hazard to the health and safety of people and the environment (Ministry for the Environment, 1992). The key to this is the assessment of and setting of controls on hazardous substances by a single authority, the Environmental Risk Management Authority (ERMA).

Management of hazardous substances is expected to focus on the adverse effects of hazardous substances on the environment rather than on the end use of the substances. Life cycle management for which controls may be imposed is expected to include use of hazardous substances. Decisions on acceptable levels of risk in cases of uncertainty should involve a precautionary approach.

The regulatory framework is expected to include overall objectives for the control of hazardous substances, performance requirements and approved codes of practice or design to meet the performance requirements set in legislation. Controls will also be provided for the avoidance or mitigation of any adverse effects of activities on the environment.

It is understood that the proposed HSNO legislation will make it an offence not to comply with the controls set on any hazardous substance. This should include any controls set on the use of hazardous substances. In addition, it is anticipated that any person will be able to prosecute for an offence under the HSNO legislation. This reform is expected to enable persons with property affected (eg, by off-target spray drift) to seek effective remedies, such as compensation and recovery of costs, for damage caused. Such provisions need to be made clear in the legislation.

Agricultural Compounds

Since not all agrichemicals and compounds used in agriculture are toxic, policy is also being developed for the management of non-hazardous agricultural compounds. There is potential for the two reforms to create a split in the administration of agricultural compounds which may lead to further confusion.

Those agrichemicals which will not be classified as toxic or hazardous under the HSNO legislation will, it is presumed, be covered by any future agricultural compounds legislation. Consistency between these two pieces of legislation in relation to the use of agrichemicals is essential. If the administration of agrichemicals depends on an assessment of whether or not they are hazardous, that may lead to fragmentation of the scientific expertise required to assess the full range of agrichemicals and their effects.

Options for Giving Legal Status to Codes of Practice

Because new legislation is being developed, an opportunity exists to build on the work of the NZAET and associated groups by devising ways to incorporate the codes that are being developed into a legal framework.

Voluntary compliance with codes by all operators is desirable. The success of the Growsafe training course in this respect, and the coordination of other industry groups under the aegis of NZAET, are most encouraging. However, unless a code of practice is given express legal status, it exists as a purely voluntary control, without the force of statutory sanctions. The approach by way of voluntary compliance is positive, but the back-up of a regulatory system is desirable for the cases in which growers and/or operators ignore voluntary controls.

For this reason, possible options are considered as to how the relevant and suitably drafted parts of a code of practice could be incorporated into one or more of the tiers of statutory control that are available to the legislature or to local authorities.

There is precedent in current legislation in New Zealand for various ways of giving legal status to relevant and suitably worded parts of a code of practice. At one end of the scale, for example, is the incorporation of a code of practice into the statutory framework by regulation. Elements of a code of practice could also be given legal status by being included, subject to the proper procedures, in regional (and in some cases district) planning instruments. Another option for giving elements of a code mandatory status is to make compliance a condition of a resource consent. At the other end of the scale is the adoption of a code of practice as a statement of 'preferred work practices' which, though not mandatory, is thereby given recognition in law.

Adoption of a code of practice by regulation

The Building Act 1991 provides that the Governor-General by Order in Council has the power to promulgate regulations in the form of a national building code which prescribes the functional requirements for buildings and performance criteria. Compliance with the building code is mandatory. A Building Industry Authority has been set up under the Act. It makes recommendations to the Minister for the purposes of promulgating regulations, including the building code. It also has advisory and review functions in relation to the building control system, but administration and enforcement of the Act and regulations are the responsibility of territorial authorities.

A framework parallel to this could be established in the Hazardous Substances and New Organisms legislation, with a suitably drafted code of practice providing national performance criteria which would be included in the legislation by regulation. The drafting technique used in the case of the building code offers a model for a code under the HSNO legislation.

Another suitable model is found in the Biosecurity Act 1993. It provides for the making of regulations which, *inter alia*, require "compliance with any code of practice (as amended from time to time) that has been issued under this Act". That provision allows for automatic updating of a regulation where a code is updated. The Biosecurity Act places some administration and monitoring responsibility on local authorities. However, unlike the Building Act, it is administered by the Ministry of Agriculture and that Ministry has the powers of sanction through its inspectors.

The role of the proposed Environmental Risk Management Authority (ERMA) could operate in a way that is parallel to that of the Building Industry Authority in recommending to the Minister the content of regulations, including any code of practice or performance criteria to be adopted by regulation. Proposals for ERMA which have been made public indicate that such a role is possible.

Adoption of elements of a code of practice into plans

The adoption of relevant and appropriately drafted elements of an approved code of practice into plans would provide a mechanism for local authorities, as 'persons exercising functions and powers under (the Resource Management Act [RMA])', to promote the sustainable management of natural and physical resources in the context of the agrichemical industry.

In general, the activity of agrichemical spraying will be regarded as a 'discharge' activity because it involves the release or emission of "contaminants" (as defined in the RMA) into the environment. Such

activities lie within the jurisdiction of regional councils and are caught by the restrictions of section 15 of the RMA, since (and to the extent that) pesticide spraying involves the discharge of contaminants into the air, and in some cases into water.

In setting up a restrictive regime for discharge activities, section 15 contemplates two scenarios. The first relates to the discharge of contaminants into water, onto land in circumstances which may result in the contaminant entering water, or into the air or onto land where the discharge is from an industrial or trade premise. In these cases, there is a general prohibition on the discharge unless the activity is expressly allowed by a rule in a regional plan (or proposed plan) or unless a resource consent is obtained. Though factory farms are included within the definition of an industrial or trade premise, 'production land' is expressly excluded. Therefore, in general, agrichemical spraying will fall outside the prohibition of section 15(1), unless the spraying results in contaminants entering water.

In the second scenario, the prohibition relates to discharge activities to air or land from any place or from another source, including a movable source. The restriction thus applies to both land-based and aerial spraying activities, provided the contaminants will not enter water or provided the discharges are not from industrial or trade premises. In these situations, the discharge is prohibited if it contravenes a rule in a regional plan or proposed plan, unless a resource consent is obtained or unless there is an existing use right. Thus, without a rule in a regional plan restricting these discharges, such discharges are not regulated by planning restrictions.

The implication of this statutory framework is that:

* regional councils may set up rules in plans to allow agrichemical spraying in those circumstances where it is otherwise prohibited (the circumstances described in the first scenario); or

* councils may promulgate rules to regulate the activity in certain circumstances by requiring users to obtain discharge permits where agrichemical spraying would otherwise be permitted as of right (the circumstances described in the second scenario).

The process of promulgating rules in plans is subject to the requirements of public consultation, as set out in the RMA. Using that procedure, regional councils could regulate certain agrichemical spraying activities through the resource consent process by adopting as rules in a publicly settled regional plan any relevant and suitably worded provisions of a code of practice, after subjecting such provisions to the test of public scrutiny (*Batchelor* v *Waimakariri* DC C46/91 [PT]). By this process councils could incorporate the standards and terms of the code into their plans in order to give legal status to appropriate elements of the code of practice.

It should be borne in mind that where a council includes a code of practice, or part of one, as rules in a plan, it cannot alter the rules where a code of practice undergoes change, nor provide in advance for alteration of the provisions of a plan where a code of practice is changed, without also subjecting the proposed changes to the planning procedures.

Where restrictions, such as the standards and terms of a code of practice, are provided for in a regional plan, the enforcement provisions of the RMA can be invoked, and ultimately the robust sanctions of the Act will be available.

Pesticide spraying - is it a land use?

Because pesticide spraying may be thought of as an integral aspect of certain land use activities and, therefore, itself a land use, there may be an argument that it should come within the jurisdiction of district councils. Section 9 of the RMA defines "use" in the context of land use to mean, *inter alia:*

> any destruction of, damage to, or disturbance of, the habitats of plants or animals in, on, or under the land:
>
> any deposit of any substance in, on, or under the land:

Although 'discharge', as defined, includes deposition, the Act appears to contemplate certain discharge-type activities as land uses, suggesting that there could be circumstances when pesticide spraying would qualify as a land use. However, 'land use', as defined, does not appear to contemplate the deposition of contaminants. Because pesticide spraying will always, it is submitted, be associated with contaminants, it is only the discharge restrictions, rather than those relating to land use, that appear to be relevant in this context.

The resource consent regime

Where a resource consent is granted, the consent authority has the power to attach conditions to the consent. Whilst section 108 does not specify a code-of-practice type approach to conditions, the scope of the discretion is such that relevant and suitably worded elements of a code of practice could be included as conditions. The enforcement and penalty provisions of the RMA are available to ensure compliance with the terms and conditions of resource consents.

To avoid difficulties arising where a code of practice is overtaken by technological developments, and where conditions based on the code are therefore no longer appropriate, a consent authority should reserve the right to review conditions. That power is available under section 128 of the RMA.

Code of Practice as a Preferred Work Practice

The Health and Safety in Employment Act 1992 also provides a paradigm for giving codes of practice legal status, albeit not mandatory status.

Under that Act, and following a statutory process of consultation, codes of practice or statements of preferred work practices may be given Ministerial approval. Those codes or statements may subsequently be taken into account in determining whether any person with a duty under the Act has taken all practicable steps to comply with the provisions of the Act. The Act also makes provision for the incorporation of documents issued by other bodies or authorities into an approved code of practice, thereby allowing for a limited process of updating or modification of a code or statement of preferred work practice.

The Building Act also makes provision for the Building Industry Authority to promulgate documents with recognised 'yardsticks' of practice against which compliance with the building code can be judged. Under that approach, the code itself is not merely the measure of compliance; it sets the standard which has to be achieved.

Using the approach of the Health and Safety in Employment Act, a statute such as the forthcoming HSNO bill could provide for an approved code of practice which would include a duty to take all practicable steps to avoid adverse effects, such as off-target spray drift, from any agrichemical spraying operation. Proof of compliance with the code would be evidence that the operator's duties under the Act had been fulfilled.

If, in the context of the pesticide/agrichemical industry, the approach of the Building Act were preferred, a national code of practice would have to be adopted by regulation, and compliance standards could be promulgated by ERMA as necessary to accommodate any legitimate variables within the industry. Safeguards are included in the Building Act to ensure that the objects and purpose of the Act and the building code are not eroded by the provision of any supplementary measurements of compliance. The same safeguard would need to be provided in the HSNO legislation.

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Glossary

adjuvant	Substance added to a pesticide formulation or the spray mix to enhance a physical property or behaviour, such as to control drift, or to enhance wetting ability or stickability
AEI	Agricultural Engineering Institute
AGCARM	Agricultural Chemicals and Animal Remedies Manufacturers Association
agrichemical	The generic term for chemicals in agriculture, including pesticides
AIA	Aviation Industry Association
bund	small embankment surrounding storage tanks or activities so that spilled substances can be retained
Codex	Abbreviation for the Codex Alimentarius Commission, a joint FAO/WHO agency responsible for international food standards
drift	The airborne movement of agrichemicals
environmental effects	(in relation to an agrichemical) Includes the likely effects that the use or continued use of that agrichemical may have on any part of the environment or on any other living organism (other than the pest or pests against which the agrichemical is intended to be used), or on the interrelationship between any such organisms
ERMA	The proposed Environmental Risk Management Authority to be set up under the HSNO legislation
FORST	Foundation for Research, Science and Technology
FRI	New Zealand Forest Research Institute Ltd
GATT	General Agreement on Tariffs and Trade
HSNO	The proposed Hazardous Substances and New Organisms legislation
IPM	Integrated Pest Management. A technique of integrating all possible methods of controlling pests and diseases in a crop including cultural, biological and the strategic use of agrichemicals

LIM	Land Information Memorandum
MAF	The Ministry of Agriculture and Fisheries
MRL	Maximum residue limit - of applied agrichemical permitted on food offered for sale
MSDS	Material Safety Data Sheet
NPHCIC	National Poisons and Hazardous Chemicals Information Centre
NZAET	New Zealand Agrichemical Education Trust
NZFOA	New Zealand Forest Owners' Association
NZLIRA	New Zealand Logging Industry Research Assocation
NZQA	New Zealand Qualifications Authority
PCA	Pest Control Association
pest	Any unwanted mammal, bird, reptile, amphibian, fish, insect, arthropod, mollusc, nematode or other worm, plant, or fungus, not being an organism living on or in man or any livestock; and any bacterium or virus affecting plants
pesticide	A substance or mixture of substances suitable for the eradication or control of any pest. This control can be effected by way of modification of behaviour or development. A pesticide includes any substance or mixture of substances which can be used as a plant growth regulator, or a defoliant, or a desiccant. Pesticides, therefore, include fungicides, herbicides and insecticides
Pesticides Board	The authority currently responsible for registering pesticides in New Zealand
PHC	Public Health Commission
phytosanitary	'clean plants', ie in terms of them being free of any pest or pests as defined above
PIM	Project Information Memorandum
RPS	Regional Policy Statement (prepared under the Resource Management Act 1991)
SNZ	Standards New Zealand
WHO	World Health Organisation