

Managing Persistent Organic Pollutants and Intractable Agrichemicals in the Waikato Region

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Executive summary

Under New Zealand's obligations to the Stockholm Convention the removal of persistent organic pollutants (POPs)¹ can be viewed as being of immediate concern to government, and the collection and disposal of other legacy and obsolete agrichemicals is an ongoing issue.

It is widely accepted that, when inappropriately stored, used, or disposed of, agrichemicals pose environmental risks and risks to the health of animals and humans. The focus on these problems has elevated since the 1989 international Basel Convention and again since 2001 when New Zealand became a signatory to the Stockholm Convention on POPs.

Joint efforts since 1992 between the Ministry for the Environment (Ministry for the Environment), regional councils and territorial local authorities have resulted in a number of collections of agrichemicals being made throughout the country. Results from these collections have helped identify the risks these products pose and the unknown amount still present in New Zealand's rural environment.

Project background

The February 2007 Regional Waste and Contaminated Land Officers Forum² identified issues of concern relating to the presence of legacy and obsolete agrichemicals in New Zealand, especially POPs. Issues identified included confinements of Ministry for the Environment funding and the need for an assessment of how well current funding, which runs out in 2009, will produce required compliance under the Stockholm Convention and address the ongoing issues of agrichemical disposal. The Ministry for the Environment have set a threshold of identifying when a region is effectively 'clear' of agrichemicals and defined clear as having less than five tonnes of product remaining in a region. Issues have also arisen in terms of the robustness of the estimations of the amount legacy and obsolete agrichemicals remaining in the country. Prompted by these and other issues raised at the Forum, this document explores the current position and problems, before offering recommendations to resolve these problems and improve the current position.

History of collections

In 1992 the then Waikato Regional Council (now Environment Waikato), undertook a region-wide on-farm collection of unwanted agrichemicals. Since 1992, a number of transfer stations in the region were equipped with facilities to accommodate agrichemical drop-off and numerous small-scale on-farm collections have been made. Between 1992 and 2007 approximately 96 tonnes of unwanted agrichemicals were collected in the Waikato region. Similar collection methods have been utilized in other regions of New Zealand, netting a total of 756 tonnes.

One important point that can be concluded from the collections undertaken to date, is that the majority of farmers/growers will only have a small amount of agrichemical, while large amounts of agrichemical continue to be found on a small number of properties. The consequence of this is that collection results show a high mean but a low median value associated with the agrichemical volumes; care needs to be taken when using either number. Because of the low median volume, many farmers/growers will have agrichemical in quantities small enough (<20kg) to be safely received at transfer station depots or via Hazmobile collections. At the same time, however, the low median does not reflect the risk that large quantities or smaller volumes of certain agrichemicals (especially POPs) pose. The skewed distribution agrichemical volumes collected prompts questions about how to most efficiently collect the material; the need

¹ A group of persistent chemicals as defined by the Stockholm Convention. Refer to the Glossary for more detail.

² A special interest group formed and attended by Regional and Unitary Council staff.

for expensive on-farm collections is questioned. Areas that have been subject to repeated intense agrichemical collections should in theory have less agrichemical to recover. This would make on-farm collections less efficient with less agrichemical being recovered for a similar input of resources. Subsequently, it is recommended that only significant quantities and materials that pose a high environmental threat should require an on-farm collection, while all other agrichemicals, and areas already subject to more than one intensive collection, can be managed through transfer station or Hazmobile collections.

Predicting and defining volumes to be collected

Numerous predictions have been made in order to try and estimate the amounts of obsolete and legacy agrichemicals that remain regionally and nationally. As of June 2006, Ministry for the Environment estimated the Waikato region to have 77 tonnes – of a national total of 173.9 tonnes – of unwanted intractable agrichemicals. There are problems with current estimates including inconsistent and inappropriate methodologies and lack of regional consistency.

The inconsistencies and unreliability of the current estimates, coupled with the importance of establishing a good estimate, has prompted further investigation. This report uses two different methods to predict the total amount of unwanted agrichemical in the Waikato region at between 32 and 36 tonnes. They merely estimate the amount of material an on-farm collection would receive based on past participation rates, as opposed to the total amount of obsolete and legacy agrichemicals still present on properties. Although it appears that the Ministry for the Environment figures overestimates the extent of the problem in the Waikato, it is unlikely that either estimate is accurate. It is considered that, short of independently questioning farmers/growers, estimates will never be accurate. The method of independently questioning farmers/growers is suggested to be achieved through a survey. The possibility of this was trialled and appears plausible.

A reliable estimate of the amount of obsolete and legacy agrichemical remaining in any region is important for a number of reasons: to measure the compliance with international agreements (notably the Stockholm Convention) and as an indicator of the form of funding and management required to address the problem.

Changes in the Ministry for the Environment designation-list which determines the disposal method for agrichemicals in 2006 has also prompted questions. The designation-list was revised in April 2006 resulting in the number of agrichemicals in the intractable and local categories changing quite substantially. The revision of the designation-list coincided with the reversal in proportions of local to intractable material received at transfer stations. An implication of this is that the change may have been due to the revision of the list rather than a change in the types of agrichemicals received. Because it is more expensive to dispose of intractable agrichemicals (requiring export for incineration), it is postulated that along with the revision of the designation-list came a significant increase in costs associated with the disposal of unwanted agrichemicals.

These and other issues, such as differing regional characteristics, have lead to the belief that the 'clear' target of 5 tonnes per region, set by Ministry for the Environment, is not appropriate and offers neither consistency nor equity between regions.

Conclusions

This report proposes a list of future steps for the Waikato region and, by extension, the rest of New Zealand. This proposed strategy will work to remedy the many issues discussed through this report. These include obtaining better estimates of remaining obsolete and legacy agrichemicals, securing funding long-term to address the ongoing problem with the agrichemical legacy and for a transitional arrangement towards a

product stewardship system, and undertaking an improved collection method. Importantly, the strategy is able to be extended to other parts of New Zealand. The proposed strategy will help highlight the health, economic and environmental risks of obsolete and legacy agrichemicals and address both historic legacy agrichemicals and any quantities that may become obsolete, deregistered or banned in the future.

Work undertaken by Environment Waikato has led to the following conclusions regarding obsolete and legacy agrichemicals in our region:

- It is postulated that many holders of obsolete and legacy agrichemicals are unaware of their requirements under the New Zealand Gazette Notice 174 to store POPs securely.
- Dominant land use type in a district is likely to have an effect on the proportion of POPs, with dominantly drystock farming having a significantly larger component of POPs compared to a neighbouring dairy area. Differences are also expected to be present between regions with differing predominant land use types.
- While the decreases seen during repeat collection illustrate collection success, significant volumes still remain after one collection.
- Typical response rates are in the range of 45-60%, meaning that during each collection, more than 40% of farmers/growers do not have their stockpiled agrichemical quantified or characterised.
- Telephone contact with farmers/growers increases the response rate four-fold.
- Exclusive use of passive agrichemical collections in the Waikato will take a long time and not address adverse environmental effects posed by these products.
- There is an opportunity for better education regarding the risk posed by agrichemicals and the role of regional councils.
- Promotion of passive agrichemical collections will not be a high priority if there is no clear commitment to fund resources for their safe handling and disposal.
- On-farm collection methods are expensive but valuable in terms of safe transport and correct handling of obsolete and legacy agrichemicals.
- Volumes collected have a high mean but low median, resulting in a highly skewed distribution.
- The skewed distribution indicates that use of a 'mean' to estimate remaining volumes is tolerable, but using the mean to plan the collection method may result in inefficiencies.
- Current estimations of the volume of intractables remaining in a region may not be accurate and there is no separation of POPs within these estimates.
- Existing estimates of what agrichemical volumes remains in the region/New Zealand are based on extrapolating volumes surrendered by participants, not volumes that remain in any area.
- The majority of transfer stations do not currently have adequate resources to cope with the receipt of large volumes of unwanted agrichemicals.

Following the initial legacy and stockpile clear-out, guidance and limited funding will continue to be required to control unwanted agrichemicals as an 'ongoing' problem, possibly alongside a product stewardship system. The 'Agrecovery' scheme provides a useful product stewardship model from which an unwanted agrichemical scheme could be developed. The use of a product stewardship scheme also opens the opportunity to involve other industry groups such as Fonterra, Federated Farmers, Horticulture NZ and local interest groups in the life cycle of farming/growing products.

As well as an effective product stewardship scheme, there will always be a need for a long-term, permanent scheme for the collection of agrichemicals (especially POPs) which are not covered by product stewardship. This system will be required to collect the small amounts of agrichemical that remain stored on rural properties and to account for that which becomes unwanted, obsolete and legacy as time passes. Funding for, and the methods used to undertake, existing agrichemical collections are considered to inadequately address the adverse environmental impacts posed by them; a detailed review of this is overdue.

The way forward

Key issues and actions as perceived by Environment Waikato are discussed in Section 6.6 that describes challenges associated with agrichemical collections, and suggests actions which may overcome them. Environment Waikato aims to undertake many of these actions itself, but would require collaboration and assistance to achieve the remainder. As a result, recommendations are made which can be summarised as follows:

- That the designation-list undergoes an expert review, current estimates of remaining agrichemicals are improved and the feasibility of a new method of collection is assessed.
- That councils are engaged about the level and type of funding needed to provide security to ensure the collection of obsolete and legacy agrichemicals continues.
- That there is a move to a product stewardship programme. This would need to follow a transition period and also be run alongside an ongoing passive collection service for legacy agrichemicals.
- That targets to remove agrichemicals are set, taking into account the different sizes and characteristics of the districts and regions.
- That a national database is created that records the most up to date information on the amounts of agrichemicals collected and the amounts remaining in different parts of the country.
- That this report is distributed to regional councils, Ministry for the Environment, key agriculture and horticulture groups and key agrichemical education agencies, advocating a collaborative approach to implement an ongoing agrichemical collection strategy.

1 Introduction

1.1 Project background

Obsolete and legacy agrichemicals pose an environmental and health risk when stockpiled on rural properties if they are not stored appropriately and are accessible by parties unfamiliar with their characteristics and hazards. These risks increase as volumes increase and especially when certain agrichemicals or large volumes are stored in a position open to the environment or close to vulnerable receptors e.g. water bodies or a high water table. Regional Councils and the Ministry for the Environment recognised this pre-1992, with some Regional Councils choosing to become involved in managing and funding the collection and disposal of unwanted agrichemicals. This was despite ambiguity over whether they had a legal requirement to do so. Rather, the need was driven – especially since becoming a signatory to the Stockholm Convention on Persistent Organic Pollutants (POPs) – by the broader issues of threats to humans, the environment, and New Zealand's overseas markets. The Ministry for the Environment has recently (2006) defined a region as effectively "clear" of agrichemicals if there are less than 5 tonnes of product remaining in that region and believe that most, if not all, regions are clearly making progress towards this goal.

There appears to be some variation between councils in the interpretation of differences between POPs and intractables and because of this it is seen as important to state some agrichemical definitions early in this report (for more definitions see the Glossary). Agrichemical is a contraction of the term agricultural chemical and is a collective term for the various chemicals used in agriculture and horticulture. Agrichemicals can be loosely grouped into: those that are going to be used and allowed to be used, and those that are not. The aim of any unwanted agrichemical collection is to collect all chemicals that are not going to be used and not allowed to be used. What a collection actually receives are unwanted agrichemicals, that is, the products that farmers/growers no longer want and are willing to surrender for collection and disposal. Unfortunately, unwanted agrichemicals do not include all of those that are not going to be used or not allowed to be used. Unwanted agrichemicals (and those that are not going to be used or allowed to be used) can include both legacy and obsolete agrichemicals. Legacy agrichemicals are those agrichemicals that are banned or deregistered, but still held by farmers/growers. Obsolete agrichemicals are those currently registered agrichemicals that are no longer required by farmers/growers and include chemicals that have recently passed their used-by dates. Agrichemicals that have been collected for disposal are further classified according to their required mode of disposal. Local agrichemicals can be dealt with in New Zealand, while intractables must be sent overseas for both treatment and disposal. Persistent Organic Pollutants (POPs), a subset of intractables, are the 12 persistent chemicals included in the Stockholm Convention (note: all POPs are intractables but not all intractables are POPs).

Ministry for the Environment has shown a high interest in removing POPs from New Zealand's rural environment. It is believed, however, that environmental threats are posed not only by POPs but also by other obsolete or legacy agrichemicals. This is especially the case for legacy agrichemicals, such as lindane, Captafol, PCP and lead, arsenic and mercury based pesticides.

New Zealand now has 15 years experience of individual and combined regional council unwanted agrichemical collections, using a variety of methodologies and under various funding arrangements. The unwanted agrichemical collections have involved collecting all unwanted agrichemicals because it was believed that the landowners may not be in a position to separate POPs from other, less persistent, agrichemicals. Currently Ministry for the Environment subsidises the disposal costs of agrichemical collected

from a number of councils each year, while regional councils pay any remaining disposal costs as well as the costs of collecting the agrichemicals.

Environment Waikato, along with many other regional councils, has compiled a number of reports characterising the volumes of unwanted agrichemicals collected over many years. However, attempts made to identify and quantify what volumes remain in the environment are more limited. The most recent estimation (Ministry for the Environment, 2006a) indicated the Waikato region was likely to have the largest volume of uncollected obsolete and legacy agrichemicals in the country. Environment Waikato faced questions about the efficacy of their passive collection systems, especially given that they were wholly rate-payer funded, and there seemed to be little reduction in the volumes offered for collection over time. Environment Waikato recognised that at the current rate of funding, it would take many years to effectively "clear" the Waikato region. Further, it was recognised that there were a number of critical flaws in the current funding and collection systems. Importantly, as discussed below, Environment Waikato's position is not unique and the majority of the regional councils have ongoing concerns about the funding and management of agrichemical collections.

This is problematic given that, on the basis of estimates made in 2006 of agrichemicals remaining in New Zealand, Ministry for the Environment have signalled intent to conclude the agrichemical disposal funding subsidies after June 2009. Their intent to move to a product stewardship model is likely to be supported but this needs to consider and address those issues that Environment Waikato and other councils have encountered and hold serious concern about.

1.2 Purpose

This report arose from issues identified by the Regional Waste and Contaminated Land Officers Forum³ (23 February 2007). Key issues identified included:

- The Ministry for the Environment agrichemical disposal funding subsidies under the current terms ends in 2009, even though an estimated 175 tonnes of intractables, with an unknown amount of POPs, remain in the country.
- Under the current terms of funding for disposal and with the current estimations of remaining quantities of POPs, New Zealand will fall short of its targets under the Stockholm Convention.
- There is no nationally co-ordinated approach to mitigate the risk of the unintended release of stockpiled obsolete and legacy agrichemicals into the environment; existing systems are dependent on individual regions choosing to undertake unwanted agrichemical collections.
- The amount of intractable agrichemicals being collected appears to be increasing. It is not known if this represents more intractables being surrendered, is a function of improving collection methods, or is due to some other factor.
- Volumes of materials collected may be more a reflection of the method of collection than the quantity of unwanted agrichemicals remaining on rural properties, and because the collected volumes are used to create estimates of residual agrichemicals on farms, the method may be flawed.
- Although there will always be volumes of obsolete and legacy agrichemicals as land ownership/use change and new materials become obsolete there is no long-term planning for this residual waste stream.
- The experience to date shows that farmers/growers would only support an unwanted agrichemical collection system that is free, inexpensive, or where the cost was borne in the original product price.

In a survey of staff responsible for waste disposal at the 16 regional/unitary councils, 9 were explicit in supporting a collective approach to funding and broadening the approach to the collection of unwanted agrichemicals.

³ A special interest group formed and attended by Regional and Unitary Council staff.

In the context of the issues raised above, Environment Waikato staff, on behalf of the Regional Waste Officers Forum, presented a paper to the Regional Councils' Resource Managers Group in February 2007 identifying issues arising from the Ministry for the Environment's funding approach and the way collections were currently undertaken (Smith, 2007). It sought development of:

- an agreed target level of unwanted agrichemical collection and disposal both regionally and nationally to meet international agreements
- a spring-clean of unwanted agrichemicals programme with resources focused on a priority list that considered: remaining volumes of agrichemicals, capacity of councils, contractors experience, and so on
- an improved information collection system showing how much had been collected from each region, and where possible how much was estimated to be remaining, plus recognition/evidence of the ongoing residual problem post the targeted collections
- an extended producer responsibility (EPR) programme incorporating an agreed mechanism to address ongoing residual annual agrichemicals with consideration of both national and regional systems
- a system that is future proofed with long-term funding and agreed well in advance of any collections commencing
- a regular reassessment process to define what progress there is towards the target and what programme modifications are needed.

Subsequently, Environment Waikato staff identified the need to examine existing information about unwanted agrichemical collections to provide a basis for decision-making for any initiatives to move toward those desired outcomes. This report constitutes that body of work and, while based on Waikato data, draws on information from other parts of New Zealand and may be applicable to other regions.

1.3 Legislative context

The necessity of an international framework governing the environmentally sound management of hazardous chemicals throughout their lifecycles was recognised at the Basel Convention in 1989. This convention focused on trans-boundary movement and disposal of hazardous wastes. The Rotterdam Convention adopted in 1998 focuses on informed consent procedures for hazardous chemicals in international trade.

Persistent Organic Pollutants (POPs), identified under the United Nations Stockholm Convention (to which New Zealand became a signatory in 2001), have been a waste management issue in New Zealand since the early 1990's when their importation and use was the subject of careful review. After certain agrichemicals were banned farmers/growers stockpiled much of the agrichemical and thus created a 'legacy' of agrichemicals. In 2004 New Zealand became a party to the Stockholm Convention with the creation of a National Implementation Plan (NIP). The NIP formalises and timetables the identification and removal of POPs from the New Zealand environment by 2010 (Ministry for the Environment, 2007).

Implementation of the strategies for eliminating POPs in New Zealand falls as a responsibility of the Ministry for the Environment working with communities through territorial and regional authorities. Ministerial objectives for 2007-2010 with respect to the Stockholm Convention are to collect up to 57 tonnes of obsolete or legacy agrichemicals from five regions and ensure that there are five further permanent regional unwanted agrichemical collection schemes in place by June 2008 (Ministry for the Environment, 2007). To this end, Ministry for the Environment committed to making \$1.5 million available to regional councils over a three-year period commencing in July 2006 and concluding in July 2009.

New Zealand Gazette Notice 174, which came into effect on 22 December 2004, only permits the storage of POPs (excluding PCBs) if they are in suitable containers and

kept in secure and appropriate buildings with moisture control, ventilation and spill containment measures in place (New Zealand Gazette notice 174, 2004). Risks to human health and the environment must also be minimised. Many farmers/growers are likely to be:

- a) unaware of this legislation,
- b) unaware of POPs remaining on their property, and,
- c) unable to comply with the conditions of the gazette notice.

The notice also rules that regional councils and their contracted collectors must comply with strict standards of NZS 8409:2004 (especially Sections 3, 4 and 7). Councils (both district and regional) must ensure that they and their transfer stations are adequately equipped and resourced to meet these standards. In most instances, there are differences between existing resources and what is required under Gazette notice 174, and these gaps will require additional resources to fill. The Gazette notice also legislates for safe disposal of POP materials. No acceptable method of treating/destroying POPs is currently available in New Zealand, so in accordance with the notice, all POPs are intractable.

At the regional level, under the Local Government Act 2002, territorial authorities are responsible for waste management. Controlling the use of land to prevent or mitigate adverse effects from the storage, use and disposal of hazardous substances as defined under the Resource Management Act 1991 is a function of both the territorial authorities and regional councils. Environment Waikato has been proactive and taken a lead role in dealing with hazardous waste including intractable agrichemicals. This has been acknowledged through inclusion in the Long Term Council Community Plan which states that unwanted agrichemicals will be both collected and safely disposed of (Environment Waikato, 2006).

New Zealand is obligated under the terms of its Stockholm Convention NIP to complete an inventory as part of a monitoring programme of POP reduction with a target of having less than 5 tonnes per region by 2010 (Ministry for the Environment, 2006b). Note that here region is used despite the size differences around the country such that in a Unitary Council area there is one district, but in some regions there are up to 12 districts.

Monitoring progress towards this target requires not only assessment of product collected but also the continual refining estimates of both POPs and intractable agrichemical left within a region. Inaccurate estimations of POPs collected and remaining may not provide sound conclusions for the Stockholm Convention NIP or allow the accurate assessment of the risk these materials pose to our environment, economy and health.

1.4 Scale of the problem

Throughout the history of unwanted agrichemical collections in New Zealand attempts have been made to estimate the amount of agrichemical remaining both regionally and nationally (Ministry for the Environment, 1998; Drummond, 2003; Ministry for the Environment, 2006a). The most recent estimates are outlined in a report by Ministry for the Environment titled 'Intractable Agricultural Chemicals in New Zealand' (Ministry for the Environment, 2006a).

The 2006 Ministry for the Environment report attempted to quantify the volume of unwanted agrichemicals collected in New Zealand and to predict what volume remained. In 2002 it was estimated that 282 tonnes of intractable agrichemicals remained in New Zealand. After disposing of 225 tonnes of agrichemicals by June 2006, the project was seen as near completion and an updated estimate was needed to determine how much intractable material remained and to determine if further collection programmes were required. In 2006 it was estimated that a further 175 tonnes of intractable agrichemicals remained. This number was reached after adjusting

the 2002 estimate following feedback from councils and after considering data from the three-year collection and disposal programme.

Although the paucity and quality of data available to calculate the volumes of unwanted agrichemicals remaining in New Zealand is usually acknowledged, the lack of anything better means that the results appear widely accepted. This is despite variable outcomes, inconsistencies and questions about methodology and robustness of the estimates.

1.5 Report structure

This report provides a brief history of unwanted agrichemical collections in the Waikato region and discusses the many issues relating to the present collection of obsolete or legacy agrichemicals. It forms both a resource and discussion document in which the authors:

- introduce the topic of agrichemicals and summarise the collections undertaken between 1992 and 2007,
- investigate the influence of district characteristics, the type of promotion and the collection method,
- investigate the distribution of agrichemicals that have been collected and the implications this has in terms of the distribution of risk,
- discuss the inappropriateness of using the mean to plan resource needs for future collections,
- present data on agrichemicals collected through the transfer station network and discuss the standards and promotion of transfer stations as well as their potential to be used as a method of collection in the future,
- briefly discuss the disposal classifications and the anomalies apparent on the designation-list,
- discuss the estimates of unwanted agrichemicals remaining in the Waikato and the importance of good estimates,
- provide two alternative estimation methods and their limitations,
- discuss the benefits of a possible survey, and,
- put forward a strategy to provide closure of current issues, a transition to a product stewardship programme and a model that may be extended to other regions or be used to create a nationally consistent agrichemical collection programme.

2 Active agrichemical collections in the Waikato region

The process of addressing obsolete and legacy agrichemicals in New Zealand started in 1991 with a trial collection in Taranaki. The Waikato Regional Council followed this by undertaking a trial collection in 1992 which highlighted the environmental, health and economic impacts of the agrichemical stockpile on rural properties (Brodnax, 1992a). Outcomes of that project included the production of a collection manual and a region-wide collection of unwanted agrichemicals which was initiated in 1992 (Brodnax, 1992b).

Within two years, Environment Waikato, in partnership with territorial authorities, had collected over 62 tonnes of unwanted agrichemicals from farmers/growers throughout in the Waikato region. This major "spring-clean" was funded by Environment Waikato (collection costs) and Ministry for the Environment (disposal costs). From 1994, an informal collection service has been provided in the Waikato region where farmers/growers can drop off small volumes of unwanted agrichemicals at certain transfer stations. Between 1994 and 1999 10 tonnes of unwanted agrichemicals were collected at these facilities and to 2007 a further 12.3 tonnes was received. Funding for collections undertaken during 1993 to 1996 by Environment Waikato and a number of other councils was subsidised by Ministry for the Environments Sustainable

Management Fund. Later, between 1997 and 1999, a consortium of seven councils worked together to dispose of 120 tonnes intractable agrichemicals with funding support from Ministry for the Environment. Since then, some regions have maintained ongoing collections and others have run less-frequent collections both with and without Ministry for the Environment funding. More detail can be found in a report by Tredi to Ministry for the Environment (Ministry for the Environment, 2006a).

Since 2000, there have been five collections of unwanted agrichemicals facilitated by Environment Waikato with disposal costs subsidised by Ministry for the Environment. Three trial collections in 2004-2005 were designed to assess differing collection methods and two 'on-farm' collections were made in 2006-2007 targeting discrete territorial areas (Waitomo and Otorohanga Districts).

2.1 Collections undertaken

This section gives a brief overview of the agrichemical collections that have been undertaken in the Waikato region since the inaugural Roto-O-Rangi trial in 1992. Figure 1 shows the coverage of each collection and

Table 1 outlines their results. This section also discusses some of the interesting points the collections have brought to light and their implications on the wider agrichemicals issue in Waikato and beyond. Refer to Environment Waikato reports by Brodnax (1992b), Rennes (1994), Hurrell (2005) and Gauntlett (2007; 2007b) for more detailed information on the collections.

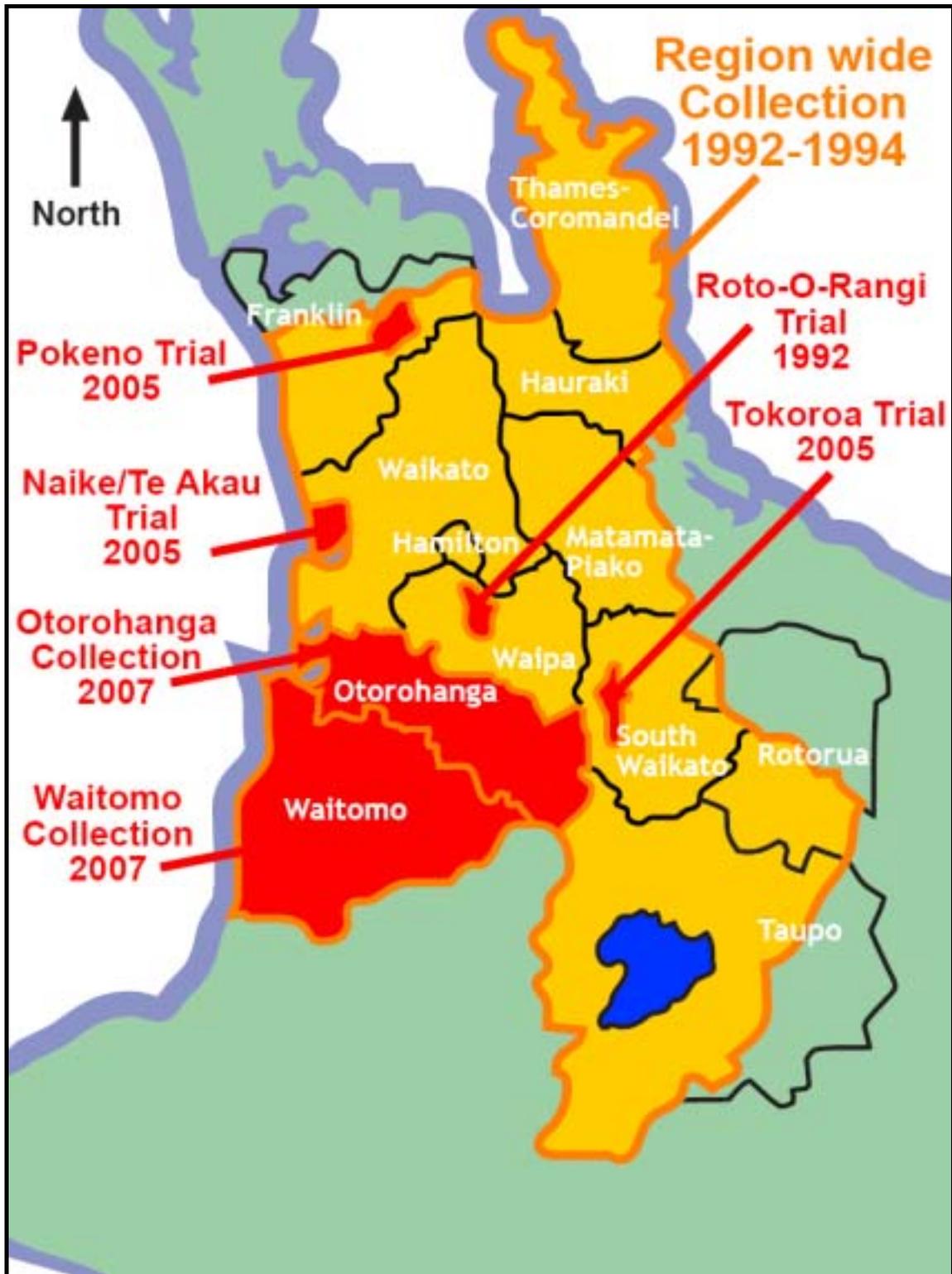


Figure 1: Locations of completed unwanted agrichemicals collections in the Waikato region from 1992 to 2007

Table 1: Summary of unwanted agrichemical collections in the Waikato region from 1992 to 2007

Collection area	Targeted farmers/growers (#)	Participants (# (%))	Total (tonnes)	Intractable (%)	POPs (%)
Roto-O-Rangi trial (1992)	150	33 (22%)	1.4	30 ^B	16 ^B
Waikato region (1992-1994)	16,841	1684 (10%)	62	30 ^B	11
Transfer station trial (2004-2005)	150	12 (8%)	0.383	75	0
Hazmobile trial (2004-2005)	176	30 (17%)	0.778	59	0
On-farm trial (2004-2005)	150	20 (13%)	0.142	50	1
Waitomo (2006-2007)	994 ^A	130 (13%)	4.5	75	6
Otorohanga (2006-2007)	1157 ^A	120 (11%)	5.5	54	<1

^A Number sourced from Agribase™, a product of AsureQuality

^B Proportions estimated from a sample of the data

2.1.1 Roto-O-Rangi trial (1992)

As a trial in 1992, 150 farmers/growers in the Roto-O-Rangi area of the Waipa District were targeted (by both letter and telephone) as part of an 'on-farm' trial agrichemical collection. A contractor collected unwanted agrichemical from each of the 33 the farmers/growers registered. A total of 1.4 tonnes was collected (16% POPs), averaging 42 kg/farm. For more information, refer to Brodnax (1992b).

2.1.2 Waikato regional collection (1992-1994)

From 1992 to 1994 a region-wide on-farm collection was offered to all 16,841 farmers/growers throughout the Waikato region. The collection, using methodology based on that of the Roto-O-Rangi trial, resulted in collections from 10% of farmers/growers in the region. A total of 62 tonnes of unwanted agrichemicals was collected (11% POPs and 13% unknown agrichemicals) averaging 37 kg/farm. For more information, refer to Rennes (1994).

2.1.3 Tokoroa, Naike/Te Akau and Pokeno trials (2004-2005)

In 2004-2005, a series of trials was designed and undertaken to determine if unwanted agrichemicals were still present on rural properties and to test the efficacy of three different collection methods. Prior to this collection there was a 10-year period where no active collections of unwanted agrichemicals were carried out; the only material recovered was that passively collected through transfer station depots (see Section 3). An enhanced transfer station trial was undertaken in Tokoroa, a Hazmobile trial in Naike/Te Akau and an on-farm trial in Pokeno. The three trials, as shown in Table 2, yielded a total of 1.3 tonnes of unwanted agrichemical from 62 farms, averaging 21.0 kg/farm. For more information, refer to Hurrell (2005).

Table 2: Volumes of agrichemicals collected from the trials in 2004-2005

Trial	Total (kg)	No. of Properties	Average volume (kg/farm)	Intractable (%)	POPs (%)
Transfer station	383	12	31.9	75%	0%
Hazmobile	778	30	25.9	59%	0%
On-farm	142	20	7.1	50%	1%
Total collected	1303	62			

2.1.4 Waitomo and Otorohanga collections (2006-2007)

A funding opportunity in 2006-2007 enabled Environment Waikato to collect a limited amount of unwanted agrichemicals and on-farm collections were organised for the Waitomo and Otorohanga Districts. While the primary objective was to collect unwanted agrichemicals, this exercise enabled an insight into the types and quantities of unwanted agrichemicals that remain in the region and that might be collected should more on-farm collections be undertaken. The results of the Waitomo and Otorohanga collections are shown in Table 3. For more information on the Waitomo and Otorohanga collections, refer to Gauntlett (2007; 2007b).

Table 3: Categories and volumes of agrichemicals collected from the Waitomo and Otorohanga districts in 2007

Area	Total (tonnes)	No. of Properties	Intractable (kg)	Local (kg)	Number of types of agrichemical ¹
Waitomo	4.5	130	3402.5 (75%)	1142.6 (25%)	127
Otorohanga	5.5	120	2945 (54%)	2552 (46%)	118
Total	10	250	6366 (63%)	3673 (37%)	

¹ Type of agrichemical is based on active ingredient.

2.2 Discussion

Table 3 shows that the Waitomo collection yielded 18% less agrichemical volume from a 7% greater number of properties compared to the Otorohanga area. The range of agrichemicals collected was 8% greater in Waitomo compared to Otorohanga. The proportion of intractable materials collected from the Waitomo District (75%) was greater than that from the Otorohanga District (54%). These differences are assumed to reflect the difference in leading land use types within each area. Waitomo is predominantly drystock farming where traditionally there was greater use of organochlorine stock remedies and broad acre insecticides. This is indicated in Table 4 which shows a correlation between the proportion of drystock farms and the amount of POPs received.

Table 4: Illustration of correlation between drystock proportion and POP volume

District	No. farms	Drystock (%)	Dairy (%)	POPs (kg (%))
Waitomo	994	70	7	265 (6%)
Otorohanga	1157	34	38	39 (<1%)

The differences between the results in the Waitomo and Otorohanga collections exemplify the effect land use may have on the types and amounts of agrichemicals received in a collection. This has implications for planning and funding future collections because it is likely that predominant land use type will affect how much agrichemical will be collected in an area. Taking this into account will allow more accurate estimations.

It needs to be noted that in the Waikato region there is a predominance of pastoral land use activities. This is especially true in the Waitomo and Otorohanga Districts collected

from in 2006-2007. Along with the differences expected when dealing with drystock versus dairying properties, it is expected that there will also be a difference in the amount of agrichemical collected from pastoral versus horticultural properties. It is postulated that this difference may be even greater than that seen between dairy and drystock farms.

Dominant land use type may affect the proportion of POPs collected in an area, as a higher proportion of POPs was collected from a predominantly drystock area as compared to dairy.

The 1992-1994 collection was offered to all farmers/growers in the Waikato region and it is assumed that every farmer/grower had the opportunity to be involved. Repeating a collection in parts of the region would provide a comparison between the two time periods to see if volumes of agrichemical on rural properties in any one area have reduced. A comparison of the results from the Waitomo and Otorohanga Districts between 1992-1994 and 2006-2007, as outlined in Table 5, suggest that both total volumes and the proportion POPs have reduced. However the amounts being collected are still significant. A similar decrease was seen in the Manawatu-Wanganui region where a region-wide collection in 1996 received 60 tonne of unwanted agrichemical and a subsequent collection in 2006 received 20 tonnes (B. Gilliland, pers. Comm., 2007). While the decreases seen during repeat collection illustrate collection success, significant volumes still remain after one collection.

Table 5: Characteristics of the 1992-1994 and 2006-2007 collections from the Waitomo and Otorohanga Districts (combined)

Date	Participation rate	Total (tonnes)	POPs%
1992-1994	6.50%	15	10%
2006-2007	11.60%	10	3%

Unfortunately it is not known whether the individual farmers/growers collected from in 2006-2007 also participated in the 1992-1994 collection. Clearly though, the amounts of unwanted agrichemical collected in 2004-2007 indicates that there are still substantial quantities of unwanted agrichemical remaining in the region – a region in which all farmers/growers have already once been offered a free collection.

Agrichemical collections are a successful means to remove obsolete and legacy chemicals. However repeat collections in the same area continue to receive significant volumes. There remains an ongoing problem of the agrichemical legacy and the fact that unwanted agrichemicals remain on farms, posing risks to human health and the environment.

2.3 Participation and response

The higher the response and participation rates are in an agrichemical collection, the more successful a collection is and the more certain a council can be of how clear an area is. With the Waitomo and Otorohanga collections in 2006-2007 the number of farmers/growers to be targeted was determined from the *Environment Waikato Properties - GIS Layer database*⁴, giving a list of names and addresses of farmers/growers to contact. See Gauntlett 2007 for more information on this procedure. If contact was made with a farmer/grower (regardless of whether they had agrichemicals to be collected) they were counted as a respondent. Farmers who registered and subsequently had agrichemicals collected are participants. 'Response rate' refers to the number of respondents relative to the total number targeted while the 'participation rate' refers to the number of participants as a proportion of those in the

⁴ The GIS database used to source farmer contacts, see the Glossary for more of a discription.

target area (note that the participation rate does not include those who registered but then, for one reason or another, didn't have agrichemicals collected).

With a couple of exceptions, participation in agrichemical collections has changed little since the early 1990s, generally being in the range of 8-17%. Participation in the Waitomo and Otorohanga District (11-13%) is probably a more reliable indicator of expected participation for the Waikato region because of the recent nature of the collections and the mixture of land uses in the two districts. Participation and response rates from other regional councils correlate well to Environment Waikato's figures. Environment Canterbury (Canterbury Regional Council), for example, has received an average participation rate of 12%⁵ (Patterson, 2007). Response rates in Waitomo and Otorohanga were 51% and 45%, respectively, while Environment Canterbury has averaged a 56%⁶ response rate (Patterson, 2007). Because numerous variables affect response rates, it is difficult to make any conclusive comments from this information. However, it does raise an obvious concern that if typical response rates are 45-60%, agrichemicals held on >40% of properties cannot be quantified or characterised without further work (refer to Section 5.5).

Response rates typically range between 45-60%, even though a response rate of 100% is targeted. Most notably, this could mean that agrichemicals held on >40% of rural properties cannot be quantified or characterised.

Caution should be exercised when directly comparing response and participation rates as contact databases and farmer/grower identification procedures differ between councils. There are also limitations present when using any one database to obtain farmer/grower contact information. Limitations of using the *Environment Waikato Properties - GIS Layer database* have included the database not giving exact details, not giving the correct contact person (i.e. the person on the property) and it has a large number of double-ups which require removal. Using this database may also restrict comparison with other councils if they do not use a similar database. There remains the possibility to use other databases. For example, the possible use of the Agribase™ has been assessed, but the use of any database has limitations. It also needs to be acknowledged that because different regions have different influencing factors (predominant land use types, requirements for agrichemical use and histories of agrichemical collections) participation rates for agrichemical collections are likely to differ. The method used to collect the agrichemical (notably the type of promotion and the type of collection) is also believed to have an effect on the participation and response rates of a collection programme.

2.3.1 Type of promotion

Hurrell (2005) surveyed 17 participants of the 2004-2005 collections and found that the majority were unaware of the role Environment Waikato has in the provision of services to dispose of unwanted agrichemicals. In addition to this, it has been suggested (Hurrell, 2005; J. Sheriden pers. comm., 2007; R. McGregor pers. comm., 2007) that for some farmers/growers the identification and safe disposal of unwanted agrichemicals is not a priority. These two points indicate that key to a successful agrichemical collection programme (that is, one with high response and participation rates) is effective communication and promotion.

There is potential to improve education regarding the environmental and human health risks posed by unwanted agrichemicals and POPs, and potential to improve general knowledge of the role that regional authorities play.

⁵ An average 12% participation rate was gained through the 16 collections undertaken in Canterbury which included both sending letters and making telephone calls.

⁶ An average 56% response rate was gained through the 16 collections undertaken in Canterbury which included both sending letters and making telephone calls.

Preferred communication media for farmers/growers include local radio, local newspaper, stock and station agent and vet, personal communication and word-of-mouth (Allen *et al.*, 2002; Hurrell, 2005). However, these methods are not always appropriate as discrete areas need to be selectively targeted. Personal communication (including telephone calls), however, is very selective and previous agrichemical collections have shown it to be very effective in increasing both the response rate and participation rate of collections.

For the Waitomo collection, it was seen that personal communication (through telephone calls) added immense benefit; 97 registrations were made by calling farmers/growers compared to just 55 registrations through the return of the registration form. This also led to a rise in response rate from 10 to 51%. A similar result was also obtained by Environment Canterbury (Patterson, 2007), showing that the significant benefit of personal communication (illustrated in Figure 2) cannot be ignored.

Experience has shown that farmers/growers prefer both letter and phone communication, and telephone communication has been shown to increase response rates four-fold.

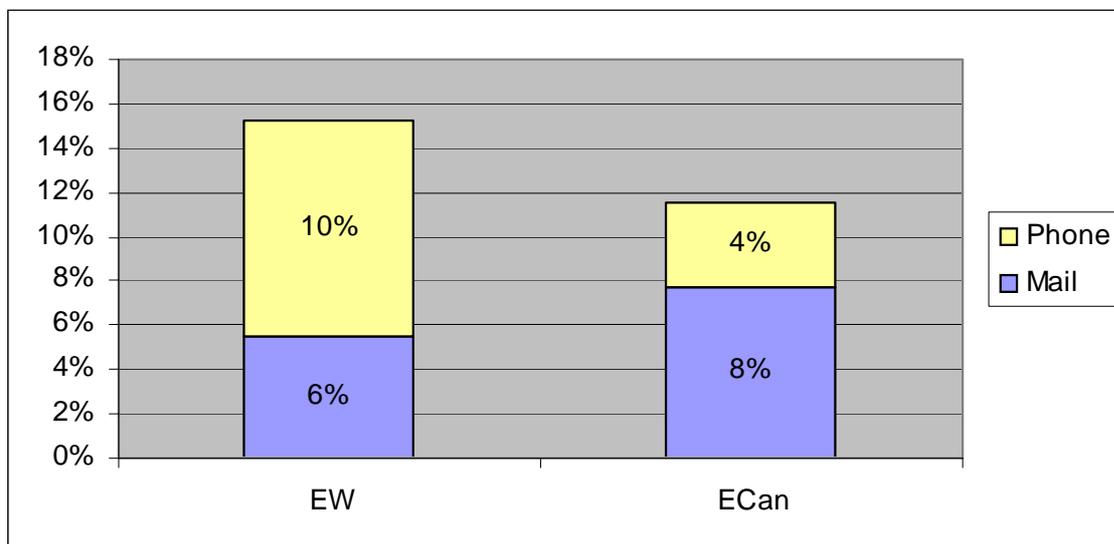


Figure 2: Example participation rate received through mail and telephone registrations for Environment Waikato and Environment Canterbury (ECan data source: Patterson, 2007)

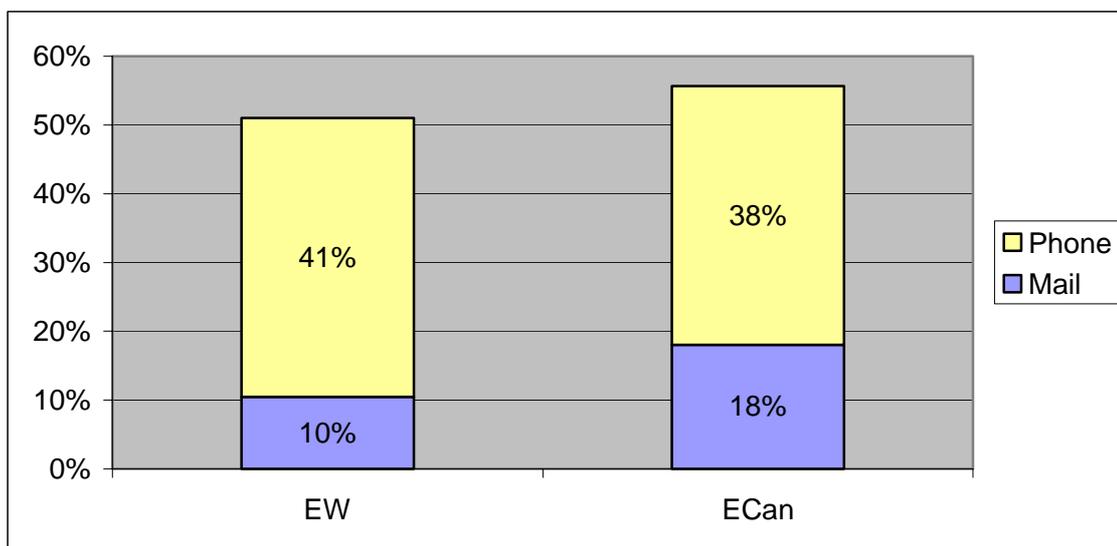


Figure 3: Example response rate received through mail and telephone registrations for Environment Waikato and Environment Canterbury (ECan data source: Patterson, 2007)

2.3.2 Type of collection

The three main types of collection (transfer station, Hazmobile and on-farm) were trialled in 2004-2005, and it was expected that the on-farm collection would gain the highest participation rate. The results were not as expected (see Table 6). However, results were probably influenced by the geographical and social differences between the areas and the extent that each had been offered a service in the past. Notably the Pokeno area is serviced by Auckland Regional Council's Hazmobile. After the collections were completed a survey was conducted, the result of which was more aligned with what was expected. The most favoured method from the participants' perspective was an on-farm collection (Hurrell, 2005) despite the participation rate being lower than that seen in the Hazmobile trial.

Table 6: Participation rate of the 2004-2005 trial collections (source: Hurrell, 2005)

Trial	Area	No. of Properties	Targeted # of farms	Participation (%)
Transfer station	Tokoroa	12	150	8%
Hazmobile	Naike/Te Akau	30	176	17%
On-farm	Pokeno	20	150	13%

Although the information pertaining to response rates for the 2004-2005 trials needs to be viewed with some scepticism for the reasons discussed above, information regarding costs is more reliable (Table 7). Clearly, the collection of unwanted agrichemicals at transfer stations was the most cost effective with the Hazmobile and on-farm collections 1.2 and 3.9 times less effective, respectively.

Table 7: Proportion of costs attributable to collection and relative efficiencies of the collection methods trialled in 2005

Collection method	Collection cost of total cost (%)	Relative cost efficiency ^{NB}
Transfer station	41	1
Hazmobile	51	-1.2
On-farm	63	-1.5

NB: Relative cost efficiency is calculated by dividing the cost of each method by the cost of the transfer station method.

In terms of funding, on-farm collections incur additional time and costs associated with locating properties, securing a collection time and travelling to farms. The value of having a trained collector visiting the properties and the risk of farmers/growers transporting agrichemicals to a transfer station/Hazmobile are acknowledged, but difficult to quantify.

Although farmers/growers appear to prefer an on-farm collection, this method is less cost efficient compared to other methods. However, on-farm collections have the added value of ensuring safe transport and correct handling of agrichemicals.

2.4 Distribution of agrichemical

Both the Waitomo and Otorohanga collection data exhibit highly skewed distributions of agrichemical volume collected from individuals; many participants had a small amount of agrichemical and few had very large amounts. The skewed nature of the data, as shown in Figure 4, can be illustrated through analysis of the large differences between the means and medians. Waitomo, with a median of 17.5kg, had a mean of 36.3kg while Otorohanga, with a median of 17.05kg, had a mean of 45.8kg. Refer to Gauntlett (2007; 2007b) for more information on these collections' results.

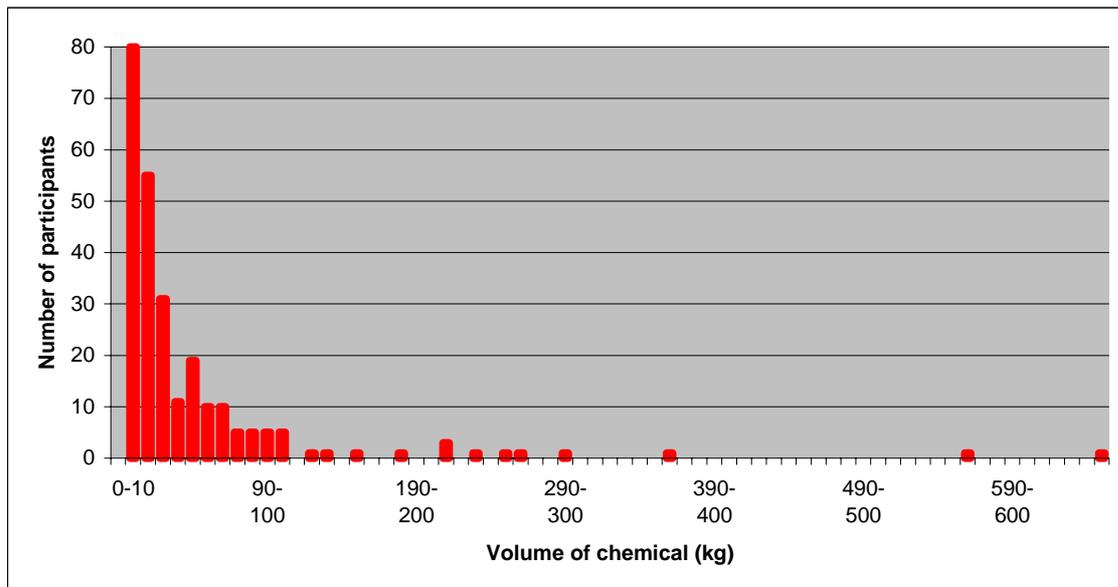


Figure 4: Histogram of volumes collected off each farm, during the Waitomo and Otorohanga collections (combined)

The skewed distribution of discrete volumes of agrichemicals received has two main implications:

- The volumes of agrichemicals and, therefore, the associated environmental and health risks are unevenly distributed.
- The use of a mean to predict the quantities of agrichemicals remaining on each property is inappropriate.

2.4.1 Uneven distribution of risk

It would be dangerous to assume that the small median volumes of the Waitomo and Otorohanga collections equally reflect the environmental and economic risk that obsolete and legacy agrichemicals pose in the Waikato region. Peak volumes for the Waitomo and Otorohanga collections were 360kg and 650kg respectively; two of the Waitomo participants surrendered POPs in excess of 85kg (96kg and 89kg); and in Otorohanga one participant surrendered 547 litres of ethoprofos (a deregistered

nematocide and soil fumigant). These quantities would, without a doubt, present a significant source of contamination should they be released into the environment.

However, the risk posed by many small volumes of obsolete and legacy agrichemicals cannot be ignored either. Small volumes are arguably more likely to be poorly managed, finding their way to the nearest soil, waterway or groundwater resource via a landfill or offal pit. There is concern that the danger posed by small volumes of agrichemicals may be underestimated by the general public. The 2006-2007 collections recovered a high frequency of small volumes and, while the proportions of POPs compared to the total amount of agrichemical collected were small (6% in Waitomo and less than one% in Otorohanga), the threat outweighs the quantity.

2.4.2 Inappropriate use of the mean

Collection planning to date, both in the Waikato and elsewhere in New Zealand, has been based on the estimation of a mean volume of unwanted agrichemical to be collected from *each* farmer/grower and the total being estimated via extrapolation of that mean. Using this method to estimate the *total* amount of unwanted agrichemical to be collected is valid, but the use of that mean to estimate how much product will be collected from *each* farmer/grower is not. The main implication of this is that collecting agrichemicals 'on-farm' from each registered person may seem appropriate when, in actual fact, perhaps it is not. When stating a mean, for example 30kg/farm, it suggests that each farmer/grower collected from will have 30kg. This will not be the case; the Waitomo and Otorohanga results show that most farmers/growers will have a small amount and a few will have a much higher amount. In Waitomo and Otorohanga (combined) 90% of the farmers/growers only contributed 50% of the total agrichemical collected.

Using the median volume would show that, with the exception of POPs and large quantities of agrichemical (both discussed above), a majority of participants could easily and safely dispose of their unwanted agrichemical at a transfer station depot or through a Hazmobile collection. Transfer stations commonly accept agrichemicals in quantities less than 20kgs and it was seen that 54% of the participants in Waitomo and Otorohanga (combined) met this criteria. Given this, it is suggested that a combination of a transfer station/Hazmobile collection may be the most appropriate collection mechanism with an on-farm service available on-demand for high-risk agrichemicals (especially POPs) and large quantities.

The option of basing a disposal strategy around transfer stations or a Hazmobile is attractive, due to its relatively low cost (see Section 2.3.2). Collections based on a transfer station depot or Hazmobile rely on the participants transporting unwanted materials to a collection point and represents considerably better value-for-money from a funder's perspective than on-farm collections. A transfer station collection programme may also be advantages in that the participants would have a greater ownership of the issue and some may prefer the comparative anonymity of dropping off unwanted agrichemicals without anyone knowing where the chemical came from. There is, however, the added health and safety risk of participants transporting agrichemical and there are questions over their ability to separate out high risk agrichemicals and POPs from other agrichemicals.

The recovery of unwanted agrichemicals unevenly distributed, with most agrichemical being received in small quantities. This makes the use of a mean to choose future collection methods unreliable.

3 Passive agrichemical collections in the Waikato region

An informal, passive collection service has been provided through territorial authority transfer stations in the Waikato region since 1994 with depots initially accepting agrichemicals in Hamilton, Te Kuiti, Ngatea, Waihi, Waihou and Matamata. Since 1994 the number of collection depots at transfer stations has increased from six to 22 currently operating, as shown in Figure 5.

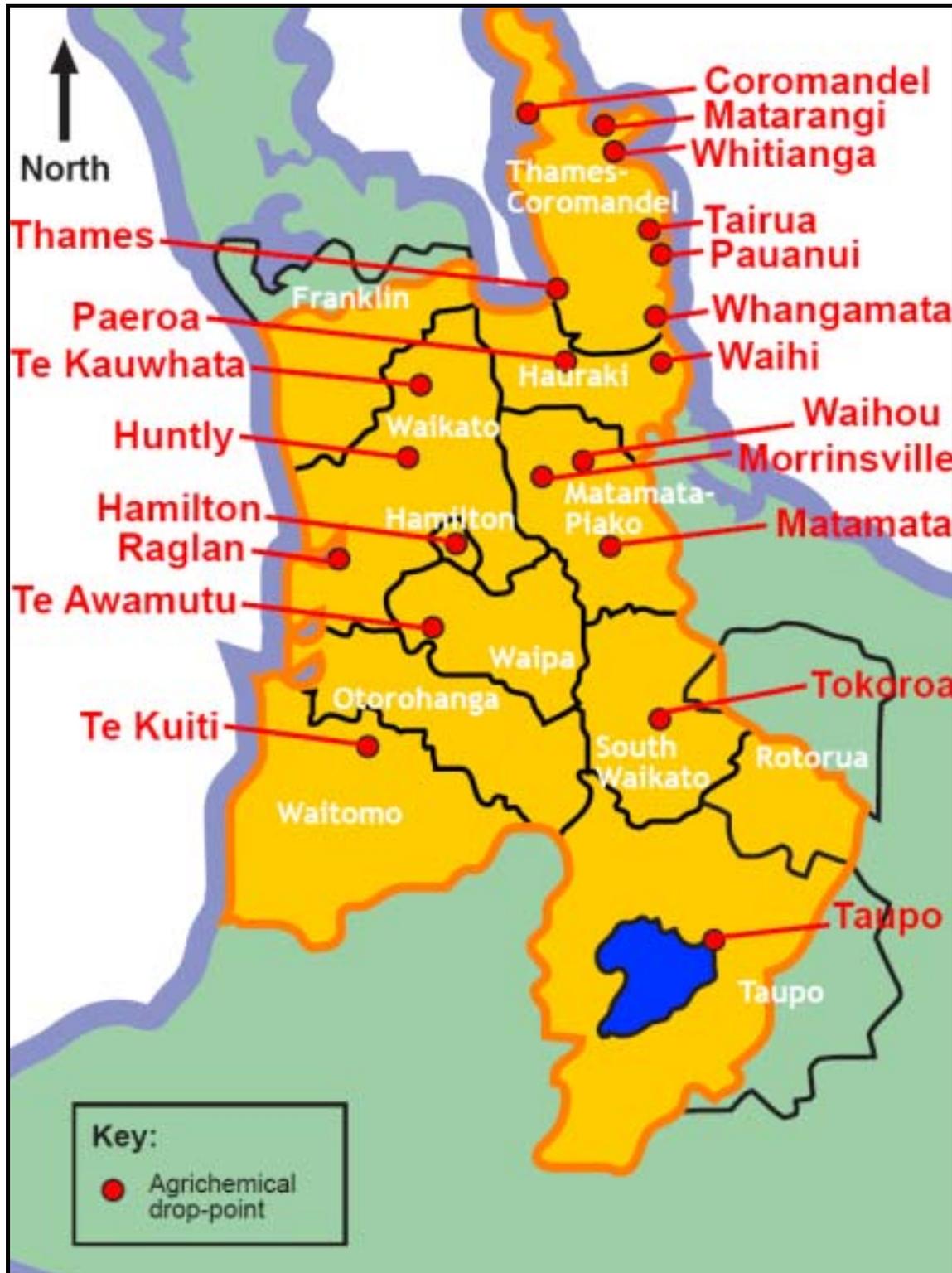


Figure 5: Location of transfer stations in the Waikato region that accept agrichemicals.

Nine of 12 (75%) territorial authorities are partners with Environment Waikato in providing the disposal service. Within such a partnership, the territorial authority provides and manages the reception facility and pays for the disposal of the household hazardous waste, Environment Waikato funds the sorting of all the chemicals, and Ministry for the Environment funding finances the disposal of the agrichemicals. The service is intended only for the disposal of small individual volumes of hazardous wastes with most accepting only individual quantities of agrichemicals of less than 20kgs. When the storage facility is full, the collection contractor is contacted to clear the station. This is usually done annually or biannually.

The service is not offered at all transfer stations and has been little promotion of the service for disposing of unwanted agrichemicals in the Waikato (see Section 3.2). The maintenance standards and quality of service offered is variable between transfer stations and is said likely to have an impact on the effectiveness of the service (R McGregor, personal communication, 2007). Staff training and the development of management procedures requires some further input, but the largest deficit appears to be in sufficient and well-targeted publicity (Blutner, 2007).

Environment Waikato also offers a free 'phone-in' collection for farmers/growers with large or dangerous quantities of agrichemicals making up another part of the passive collection service that has been offered since 1994. Although this has also not been heavily promoted, between July 2003 and June 2007 a total of 5.2 tonnes was collected via this method. Approximately 56% of this was intractable.

3.1 Standards and quality

In June 2007 Environment Waikato funded on-site training to 24 personnel from 10 transfer stations⁷. The training was focused on the management of toxic household waste and agrichemicals and was conducted at five transfer stations, each of which received advice on the standard of their operation. Only one of the transfer stations was operating at an acceptable safety standard. All staff participating in the training did so with enthusiasm and full engagement, leading to the conclusion that the safety issues were not with staff rather with the infrastructure and possibly management procedures (Blutner, 2007).

Blutner (2007) identified inadequate record keeping as a recurrent failing at the transfer stations inspected. Agrichemicals are categorised by staff at the transfer station as either Class 6 (Toxic substances) or as Unknown, requiring a basic knowledge of safety procedures rather than technical expertise. There is no specific HSNO requirement for Approved Handler certification, however, as this training is dependent on the volume of material handled. Blutner (2007) concluded that the transfer station staff were willing and able to learn the fundamentals of hazardous waste handling, indicating this is not a barrier to developing these facilities.

There has been an identified lack of promotion of the agrichemicals facilities available at transfer stations region-wide (Hurrell, 2005; R. McGregor pers. comm., 2007; Blutner, 2007). These facilities have the potential to play a significant role in the collection of unwanted agrichemicals in the Waikato region and potentially elsewhere in New Zealand. The Waikato region has 22 collection depots, albeit with perhaps not the best geographical distribution. However, the investment in appropriate infrastructure to accommodate agrichemicals being dropped off at these locations has been made.

Although further publicity of the agrichemical collection service at transfer stations is required, resources at transfer stations need to be improved in order for transfer stations to be able to safely manage larger volumes.

⁷ Tokoroa, Raglan, Hamilton, Taupo, Te Kuiti, Matamata, Morrinsville, Paeroa. Two other transfer stations were included (Tirohia and another one in Hamilton) that do not receive agrichemicals.

3.2 Promotion

The lack of promotion of transfer station or phone-in collections is not exactly unwarranted. Barriers to this investment are predominantly financial, both directly through the cost of advertising the service and indirectly through the cost of managing greater volumes of hazardous wastes. An example of this is a budget 'blow out' experienced by Environment Waikato in 2004 when unpredicted quantities of agrichemicals were deposited at transfer station depots for which the disposal costs had not been budgeted (D. Stagg pers. comm., 2007).

Unless there is a clear and ongoing commitment to pay for the disposal of the ongoing volumes of unwanted agrichemicals deposited at transfer stations, those who manage and administer them will be cautious about promoting the service.

3.3 Quantities collected

Unwanted agrichemicals continue to be dropped off at transfer stations at quite a significant rate despite the service not being promoted and – of more concern - without any signs of this volume diminishing. Collection data from the 22 Waikato region transfer stations was collated and analysed to identify patterns in the quantities and fate of unwanted agrichemicals received. Figure 6 presents the annual volumes collected from 2003⁸ to 2007.

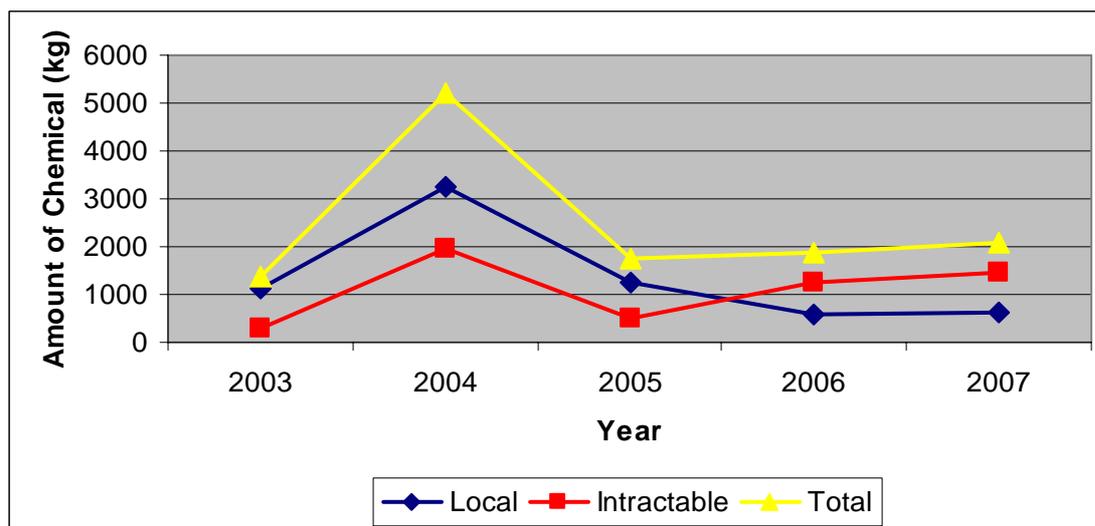


Figure 6: Annual volumes of unwanted agrichemicals collected from the Waikato region transfer station facilities from 2003 to 2007

Over the period 2003 to 2007 the total volume of agrichemicals collected at transfer stations was 12.3 tonnes with a peak volume collected in 2004 of 5.2 tonnes. The median annual tonnage collected was 1.9 tonnes, around 35% of the peak volume. The mean volumes of local and intractable material are 1.3 tonnes and 1.1 tonnes, respectively. A total volume of 587kg of POPs was collected.

Between 2005 and 2006, the proportions of unwanted agrichemicals designated for local or international disposal reversed (Table 8). A comparison (sample size 100 being the top 20 by volume from a random sample of five collection depots) of the agrichemical types pre- and post-2006 indicated that 86% were similar products (by active ingredient). This indicates that the change in volumes is likely to be attributable to a change in those defined as 'intractable'. This change is discussed more in Section 4.

⁸ Prior to 2003, data from the collections made from transfer stations was combined with other sources and is, therefore, not suitable for analysis.

Table 8: Proportion of unwanted agrichemicals designated for local or international disposal

Disposal method	Pre-2006	Post-2006
Local (including reissue)	67%	31%
International	33%	69%

The issues identified have resulted in an apparent under utilisation of transfer stations as agrichemical drop off points. The Waikato region, with 22 collection depots, may be best positioned to demonstrate a more efficient strategy for tackling the ongoing need for an efficient system of dealing with unwanted agrichemicals.

An example of the amounts collected via the phone-in service is shown in Table 9 which outlines the totals collected for the 2004-2005 and 2005-2006 financial years.

Table 9: Information from phone-in collections for the 2004-2005 and 2005-2006 financial years

Financial Year	Local ¹ (kg)	Intractable (kg)	Total (kg)
01/07/04 - 30/06/05	1115.8	1323.3	2439.1
01/07/05 - 30/06/06	1007.5	1244.6	2321.8

¹ Local includes amounts that were reissued

4 Disposal designation classification

Unwanted agrichemicals collected for disposal are sorted into three disposal categories according to a nationally-applicable designation-list, as required by Ministry for the Environment. Current practice is for the collection contractor to sort the material at the point of collection according to the following three disposal categories:

- Intractable – Intractable agrichemicals include POPs and are required to be sent overseas for disposal through high-temperature incineration.
- Local – Local agrichemicals are those which are designated to be treated and disposed of in New Zealand. Agrichemicals designated for local disposal follow one of eight denaturing pathways prior to disposal in approved landfill.
- Commercial – Commercial chemicals are those that are not covered by the agrichemical collection scheme.

All material collected, both in the Waikato and from collections in other parts of New Zealand, is transported to the Auckland depot of Transpacific Technical Services Limited (TTS, formally Medi-Chem Waste Service Limited) for disposal.

Prior to April 2006, the designation-list was prepared by Chemwaste Industries Limited. The list was revised in April 2006 by the then Medi-Chem Waste Service Limited (now TTS) and approved by the Ministry for the Environment. The number of agrichemicals in the intractable and local disposal categories changed quite substantially during the revision with a large increase in those deemed intractable (Table 10) (Chemwaste, pers. comm., 2007).

Table 10: Number of materials by designation pathway pre- and post- 2006

Disposal	Pre-2006	Post-2006
Intractable	199	972
Local	129	499
Total	328	1513

The revision of the designation-list coincides with the reversal in proportions of local to intractable material received at transfer stations in 2006 (see Section 3.3). An implication of this is that the change may be due to the revision of the list rather than a

change in the agrichemicals received by the transfer station. The change in the proportion of local to intractable agrichemicals on the designation-list (pre-2006 39:61, post-2006 32:68), however, does not match the change seen at transfer stations (pre-2006 67:31, post-2006 33:69). This may suggest that the designation of some of the more commonly received agrichemicals have changed from local to intractable.

The way that agrichemicals are classified for disposal has important implications for funding of the disposal process. The cost of shipping and disposing of intractable materials, that is those required to be shipped overseas for treatment and disposal, is considerably greater than local disposal. Intractable materials incur a treatment and disposal cost of around \$20/kg compared to the local cost of between \$1-\$3/kg. It is postulated that with the revision of the designation list came a significant increase in the costs associated with the disposal of unwanted agrichemicals.

The review of the designation list resulted in questions regarding consistency, and has most likely lead to higher costs of disposal, which will be borne by regional councils after 2009 when funding ceases.

Some obvious discrepancies in the designation pathways are apparent. A direct comparison between the pre- and post- 2006 designation-list is difficult as the latter contains considerably more products. However, there are indications of inconsistencies in the post-2006 designation-list. For example, the active ingredients in synthetic pyrethroids (cypermethrin, deltamethrin and permethrin) are designated intractable while products containing the same active ingredients are designated for local disposal. Products containing glyphosate are deemed suitable for local disposal while other herbicides (e.g. diquat, paraquat, MCPA and MCPB), with a similar purpose and arguably a similar environmental threat, are designated intractable. The implications of this are that there are quantities of agrichemical currently being treated overseas that could, at least in theory, be treated locally.

It is not known whether there was an independent expert reviewer in the designation-list revision process, but a system that allows the organisation that profits from disposing of intractable agrichemicals to also develop the disposal designation-list raises concerns about objectivity that should be addressed to protect them as well as the parties involved with the agrichemical collections.

In light of the above observations, it is advised that an independent-expert reviews the designation-list. The expert review is important because it might have substantial impacts on current and future costs of agrichemical collections. Clearly, maximising the volumes of agrichemicals that can be treated less expensively in New Zealand would free up funds allowing greater total volumes to be disposed of. Revision of the designation-list cannot be made in isolation, however, and consideration must be given to constraints on the capacity within New Zealand to dispose of unwanted agrichemicals. This could be within the facilities for denaturing treatment and the capability for the available landfill sites to accommodate the treated materials. There is also scope to reduce the volumes of intractable material by treating diluted and concentrated products differently. Large volume, highly dilute product could – if it posed insignificant environmental risk – be removed from the collections with information provided about how to safely dispose of this product.

An independent expert review of the designation list is recommended to minimise disposal costs and protect the parties involved in the disposal process.

5 Predicting remaining volumes of unwanted agrichemicals

5.1 Importance of robust estimates

The importance of robust estimates of what obsolete and legacy agrichemicals remain in New Zealand is threefold:

- first, to enable quantification of the environmental risk such agrichemicals pose.
- second, to determine New Zealand's compliance with signed international agreements, in particular fulfilling the commitments to the Stockholm Convention.
- third, to allow those facilitating the removal of agrichemicals to effectively and efficiently plan and undertake the removal.

There are three key difficulties in predicting the amounts of obsolete and legacy agrichemicals remaining in the Waikato region and nationally:

- The quantity of obsolete and legacy agrichemicals is a moving target. Volumes will change in response to the status of individual products.
A recent example is the removal in August 2007 of diazinon from the spray programme for kiwifruit in response to changes in acceptable residue levels for a major market (Zespri International Ltd., 2007). There is no doubt that there will be kiwifruit growers who have stockpiled this product who will now wish to dispose of it. (Authors note current listings of diazinon on internet site TradeMe). Chlorpyrifos is also being carefully considered and could be removed from the kiwifruit spray programme due to pressures from European retailers (R. Gilbertson, pers. comm., 2007).
- The willingness of farmers/growers to volunteer obsolete and legacy agrichemicals.
There are still significant quantities of DDT being volunteered for collection some 15 years after the well-publicised banning of the substance and a free regional collection service being available (see Gauntlett (2007)).
- Characteristics of certain areas will affect the amounts and types of obsolete and legacy agrichemical remaining.
A comparison between results from the 2006-2007 Waitomo and Otorohanga collections shows that the district with a higher proportion of drystock farms has a higher proportion of both intractable materials and, more importantly, POPs (see Section 2).

Any system devised to ensure the safe removal of obsolete and legacy agrichemicals must address all these issues, unconstrained by commitments to the Stockholm Convention and addressing the wider issue of the safe disposal of all obsolete and legacy agrichemicals, not just POPs.

The basis for a workable strategy to achieve the removal of obsolete and legacy agrichemicals from properties where they could pose negative environmental and health effects is sound information on the amounts and types of obsolete and legacy materials and the threats they pose. Towards this objective, and acknowledging problems with existing estimates, an attempt was made to see if any methods could provide more define estimates of the volume of obsolete and legacy agrichemicals in the Waikato.

5.2 Ministry for the Environment estimates

A desktop survey completed in 2003 estimated (assuming 25kg of POPs remaining per farmer/grower from whom no collections had been made), that 24.1 tonnes of intractables remained in the Waikato region (Drummond, 2003 cited in Ministry for the Environment, 2006a). The revision of the designation-list resulted in the need for a revised estimation to be made on the basis of this new list. This estimate was made in

June 2006 and increased to a figure of 77 tonnes (Ministry for the Environment, 2006a). The revised figures indicate that the Waikato region is the area where the highest volumes of unwanted intractable agrichemicals – and, by extension, POPs - are present in New Zealand. The revision of the designation list and its implications are discussed in Section 4.

At the current rate of passive collection (outlined in Section 3 as around 2.5 tonnes of intractables per year) it will take over 30 years to clear the Waikato region of unwanted intractable agrichemicals and, assuming no change to that volume by for example, deregistration of currently registered agrichemicals. If these estimates are correct, unless the collections are accelerated, the region will continue to face environmental risks from unwanted agrichemicals over a substantial period of time.

Exclusive use of passive agrichemical collections in the Waikato will take a long time and not address adverse environmental effects posed by these products.

There have, however, been problems recognized with current estimations, including inconsistent and inappropriate methodologies behind the predictions.

5.3 Environment Waikato estimates

Two methods were undertaken to estimate the volumes of unwanted agrichemicals remaining in the Waikato region. These estimations, however, are a function of on-farm collection methods. They estimate the quantity of unwanted agrichemicals to be collected more than being an accurate prediction of the amounts of obsolete and legacy agrichemicals that actually remain.

Method 1 estimated the quantity of unwanted agrichemicals based on a simple linear model which reflected the differences collected from dairy and drystock properties. Method 2 was based on the extrapolation of the average collection volumes per farmer/grower for the same estimation. Both methods used information from the Environment Waikato Properties - GIS Layer database to identify land use, which was ultimately divided into dairy and drystock. Details of the methodology are in Appendix 1. Method 1 was subject to intrinsic errors ($\pm 4\%$) due to the simplicity of the linear model and method 2 was subject to a similar intrinsic error attributable to rounding variation. The results of these methods are shown in Table 11.

Table 11: Environment Waikato Estimates of unwanted agrichemical remaining to be collected in the Waikato region

Volume	Method 1 (tonnes)	Method 2 (tonnes)
Total	36	32
POPs	1.056	0.699

In the Waikato region, the estimated total volume of unwanted agrichemicals still to be collected is in the range of 32 to 36 tonnes. This includes a volume of POPs of between 0.7 and 1.1 tonne. Method 1 has a tendency toward a larger estimate of total volume where there are a large proportion of dairy farms with the converse holding for volumes of POPs. The estimation under Method 2, which accommodates differing land use types, estimates 18.3 tonnes of intractables to be collected. Using the proportions from the regional transfer station collections (69% intractable) would give a range from 22 to 25 tonnes. This figure for intractable agrichemicals is considerably lower than the Ministry for the Environment figure.

Notwithstanding the possibly erroneous assumption that the collections from Waitomo and Otorohanga represent the removal of the majority if not all obsolete and legacy agrichemicals in these areas, the method for estimating regional volumes of unwanted

agrichemicals has some other limitations. The predictions may be overestimates in areas where there have been targeted collections (such as Pokeno, Naikē/Te Akau and Tokoroa where in trial collections took place in 2004-2005) and the Franklin District is serviced by the Auckland Regional Council Hazmobile.

5.4 Limitations of the estimates

Currently, there is a large disparity between Ministry for the Environment estimates of unwanted intractable agrichemicals remaining in the Waikato region (77 tonnes) and the Environment Waikato estimate of total unwanted agrichemicals in the Waikato region (32-36 tonnes). Although it appears that the Ministry for the Environment estimate drastically overestimates the extent of the problem, it is unlikely that either estimate is accurate.

The main flaw in using the Ministry for the Environment or Environment Waikato estimates is that they are based on amounts collected rather than amounts remaining - estimating the amount of unwanted material as opposed to the amount of obsolete and legacy agrichemical. The estimates, therefore, assume farmers/growers volunteering agrichemicals for collection (8-17%) represent the majority, if not all, those with obsolete and legacy agrichemical on their property. The alternative is to assume that a proportion, if not all, of the farmers/growers that did not volunteer agrichemicals for collection (83-92%) had the same volumes as those that were collected from. In the absence of quantitative information that could help determine which of these is likely, or where between them the truth is likely to lie, estimations using these methods are problematic. Questions also arise as to the use of an estimation of unwanted agrichemicals as an indication the amount of obsolete and legacy agrichemicals remaining. This amount of obsolete and legacy will always be larger than the amount of unwanted agrichemicals as some farmers/growers will be reluctant to surrender their obsolete and legacy agrichemicals (and they are therefore not 'unwanted').

It is widely agreed amongst council staff that the estimation of uncollected obsolete and legacy agrichemicals is difficult. An informal regional council staff survey in 2006 estimated that, in the five districts that provided figures (Waikato, Gisborne, Wellington, Canterbury, and Southland), 165.5 tonne of unwanted agrichemicals remains uncollected across New Zealand. However, as this is only from those five regions which supplied an estimate, it is anticipated that there will be additional volumes in other areas (Hawkes Bay, West Coast, Otago, and Northland). In addition, it has been noted that the volumes are probably more a reflection of the collection method and keenness of farmers/growers to surrender material rather than an indicator or the actual quantity of obsolete and legacy agrichemicals that exists. There may also be some problems with the reporting of POPs and intractables collected due to some variation in interpretation of the terms between councils.

Existing estimates of what agrichemical volumes remain in the region/New Zealand are based on extrapolating volumes of unwanted agrichemicals surrendered by participants, not volumes of obsolete and legacy agrichemicals that remain in any area.

The Ministry for the Environment report (Ministry for the Environment, 2006a) assumes that a region is 'clear' when it is estimated to have less than five tonnes of unwanted agrichemical remaining. While Environment Waikato has invested considerable resources to study the issue of unwanted agrichemicals in their region, not all regional and unitary authorities have been able to do the same. It is unlikely that the Ministry for the Environment figures overestimate the amount of intractable agrichemicals remaining in regions other than the Waikato. For example, Ministry for the Environment estimates for the Hawkes Bay, Bay of Plenty, Marlborough, Tasman and Gisborne regions were zero, or very close to zero. However, collections undertaken in Tasman District and the Hawkes Bay Region in 2006-2007 (after their classification by Ministry for the Environment as "clear") received significant volumes (19 and 10.3 tonnes

respectively), clearly indicating flaws with the methodology used to reach the “clear” estimates. Recent communication from Tasman District (J. Easton, pers. comm., 2007) indicates that there is a confirmed total of 10 tonnes of unwanted agrichemicals on 214 properties waiting for disposal due to a shortage of funding. Hawkes Bay Regional Council undertakes collections three times per year, obtaining a similar volume each time (F. King, pers. comm., 2007). It is apparent that neither region is ‘clear’ of unwanted agrichemicals (and by extension, POPs). In addition to this, it is highly unlikely that the recent Hawkes Bay and Tasman collections identified all the obsolete and legacy agrichemicals remaining, meaning they have still not reached effective “zero”. This raises again questions as to the reliability and usefulness of using an estimation of unwanted agrichemicals to measure success of removing obsolete and legacy agrichemicals from an area.

Further, the logic is questionable to use the same ‘clear’ category based on volume in a region regardless of that region's size. For example, it is much easier for a small unitary region such as Tasman to obtain a total of less than five tonnes than a large region such as Canterbury. Conversely, five tonnes of agrichemical in a small region like Tasman carries a greater risk per hectare than five tonnes in Canterbury. It seems more useful to base any classification on number of properties or land use type to be able to provide comparisons between districts or regions. The use of an estimate of remaining unwanted agrichemicals as a measure of how ‘clear’ a region is, is also flawed. This is because a region with effectively zero unwanted agrichemicals may still have volumes of obsolete and legacy chemicals that are not unwanted and, further to this, as time passes more agrichemicals will become obsolete, legacy and unwanted.

Existing definitions of a region being ‘clear’ of agrichemicals do not reflect land use types or scale differences, and do not match the reality of product still being surrendered in these areas.

Although significant problems have been identified with estimations of agrichemical volumes remaining, the lack of better estimation methods means that current estimates have been widely accepted. There is a need for better estimation methods that are consistent across regions.

Realistically, it is not known exactly what quantities of obsolete and legacy agrichemicals are being held by farmers/growers. Given the shortcomings of the estimation methods used to date, there remains one option to explore - to ask farmers/growers directly about the quantities and types of obsolete and legacy agrichemicals they have on their properties. It is suggested that a purpose-designed questionnaire directed specifically at farmers/growers could help work towards a more acceptable estimate of what quantities of obsolete and legacy agrichemicals actually remain in the Waikato or other regions.

5.5 Questionnaire to assist estimates

Technical issues associated with the nature of agrichemicals means that any survey must be able to convey detailed information, particularly about the identification of obsolete and legacy products. A personal interview, either to individuals or a focus-group, is recommended as a possible option to gather information on volumes and types of obsolete and legacy agrichemicals being held on properties and whether or not these are unwanted by the farmer/grower. The survey could also help assess the feasibility of asking farmers/growers to identify and separate different agrichemicals (the need for this separation is discussed in Section 6.3). It is recommended that someone outside of a regulatory/enforcement authority undertake the survey in order to avoid reluctance to participate; examples of agencies with the neutrality to undertake the survey include: Dexcel, Federated Farmers and WaiPAC (Waikato Pesticide Awareness Committee).

An example questionnaire (attached in Appendix 2) has been designed to elicit information about the presence of obsolete and legacy agrichemicals on properties, and to solicit information about why farmers/growers may not have participated in previous collections. The information requested includes the name and type of unwanted agrichemicals, the quantities and the state of storage.

The example questionnaire and method of investigation was trialled in August 2007 by Dexcel⁹ to a focus-group of 18 dairy farm owners, sharemilkers and farm staff from Kereone, Morrinsville. The background and objectives of the survey were delivered to the group by the facilitator prior to undertaking the survey. Resource material outlining the background was provided by way of a three to five minute presentation. A total of 12 questions were then read to the group and responses recorded as a show of hands.

Feedback from the trial indicated that the issue of the safe disposal of unwanted agrichemicals does not currently feature as a priority for farmers/growers. There is little chance of achieving recognition of the environmental risks associated with obsolete and legacy agrichemicals if there are activities competing for their attention. Therefore, the timing of a survey is critical. It was indicated that late spring would be an appropriate time to undertake surveys with a lead-in in early November to warn of the impending questions. Feedback suggests that participants would like to have the questions in advance so that they knew what to look for in the way of obsolete and legacy agrichemicals before completing the survey. The form of the questions in the survey and content of the resource material were judged suitable for purpose by Dexcel and should provide sufficient quality of data to be able to confidently estimate the quantities of POPs and other obsolete and legacy agrichemicals remaining in an area (J. Sheridan, pers. comm., 2007). A copy of the final correspondence from Dexcel about the survey approach is reproduced in Appendix 3.

6 Proposed strategy

6.1 Introduction

Environment Waikato staff believe that product stewardship, as mooted by Ministry for the Environment, could be an effective and appropriate way to manage unwanted agrichemicals in the future. However, it is strongly believed that a sudden move to a product stewardship programme will not adequately address legacy agrichemicals, notably any POPs and other historical legacy agrichemicals that do not 'belong' to an existing company. Based on this, and other issues outlined in this report, a strategy to address the ongoing problems of obsolete and legacy agrichemicals is proposed.

6.2 Desired outcomes of the proposed strategy

Desired outcomes for the proposed strategy have been established as:

- better estimates of obsolete and legacy remaining on farms
- a review of the designation-list
- secure funding arrangements
- increased rural land owner/occupier responsibility and knowledge about obsolete and legacy agrichemicals and their disposal
- creation of a new collection contract
- effective and targeted use of transfer station, Hazmobile, and on-farm or phone-in collection methods
- reduced health, economic and environmental risks of obsolete and legacy agrichemicals
- management of both historic legacy and newly obsolete materials
- increased participation in agrichemical collections

⁹ Dexcel is a dairy research and consultancy trust that has 27 consultants nationwide, each servicing a discrete area each with an average of 400 dairy farms.

- a transition to a product stewardship system
- a strategy that can be extended to other parts of New Zealand.

6.3 Overview of the proposed strategy

The strategy is based around undertaking a number of actions to address the issues raised throughout this report. The logistics of the strategy are basically focused around making improvements to the current collection method - retaining both the passive collections at transfer stations and active collection programmes. An active collection scheme will be offered one last time to each of the districts in the region, other than Waitomo and Otorohanga (therefore, farmers/growers in each district will have had the opportunity to participate in two active collections), preparing to be followed by a product stewardship programme. Because of difficulties attributing the costs of some agrichemicals (see Section 6.5) it is suggested that there be a long-term passive collection system in place to deal with historic legacy agrichemicals that are not included in a product stewardship scheme.

All levels of the rural community would be targeted with appropriate and easily understandable information regarding the dangers of inappropriate storage and disposal of agrichemicals to highlight the health, environmental and economic threats. Most notably the information would allow the rudimentary identification of agrichemical by farmers/growers. The identified agrichemicals will fall into three categories, each requiring a different mode of collection. The three categories are as follows:

- **POPs and agrichemicals in volumes greater than 20kg***. These would require on-farm collection. The rural land owner/occupier would be responsible for contacting Environment Waikato, which would confirm the material identification and organise the contractor to facilitate collection.
- **Agrichemicals in volumes less than 20kg***. These would require transfer station drop-offs or Hazmobile collections and it would be the responsibility of the rural land owner/occupier to transport the agrichemical to the collection locations. The Hazmobile option is required in some areas because of the uneven geographical distribution of transfer stations around the Waikato region.
- **Diluted agrichemicals (excluding POPs)**. These would be the responsibility of the farmers/growers to dispose of and, in most instances, disposal on the land in an appropriate way would be suitable.

* The 20kg volume limit to be collected is suggested simply because this is the limit commonly set at transfer stations that receive agrichemicals. It is postulated that this limit could be set to coincide with volumes that can be transported legally by a person without a Dangerous Goods licence as required by NZ Standard NZS 5433.1:2007 *Transport of dangerous goods on land* (e.g. 50kg of Packaging Group II chemicals). However, laws regarding the transport of hazardous goods are complex, and it is recommended that individuals check with the Land Transport Safety Authority prior to carrying agrichemicals.

It should also be noted that regardless of volume, farmers/growers should not carry chemicals in containers that are leaking or damaged, to minimise the risk of accidental spillage. These chemicals should be picked up by a qualified agent who will package them securely prior to transport.

Figure 7 describes the collection and disposal pathway for unwanted agrichemicals as proposed under this strategy.

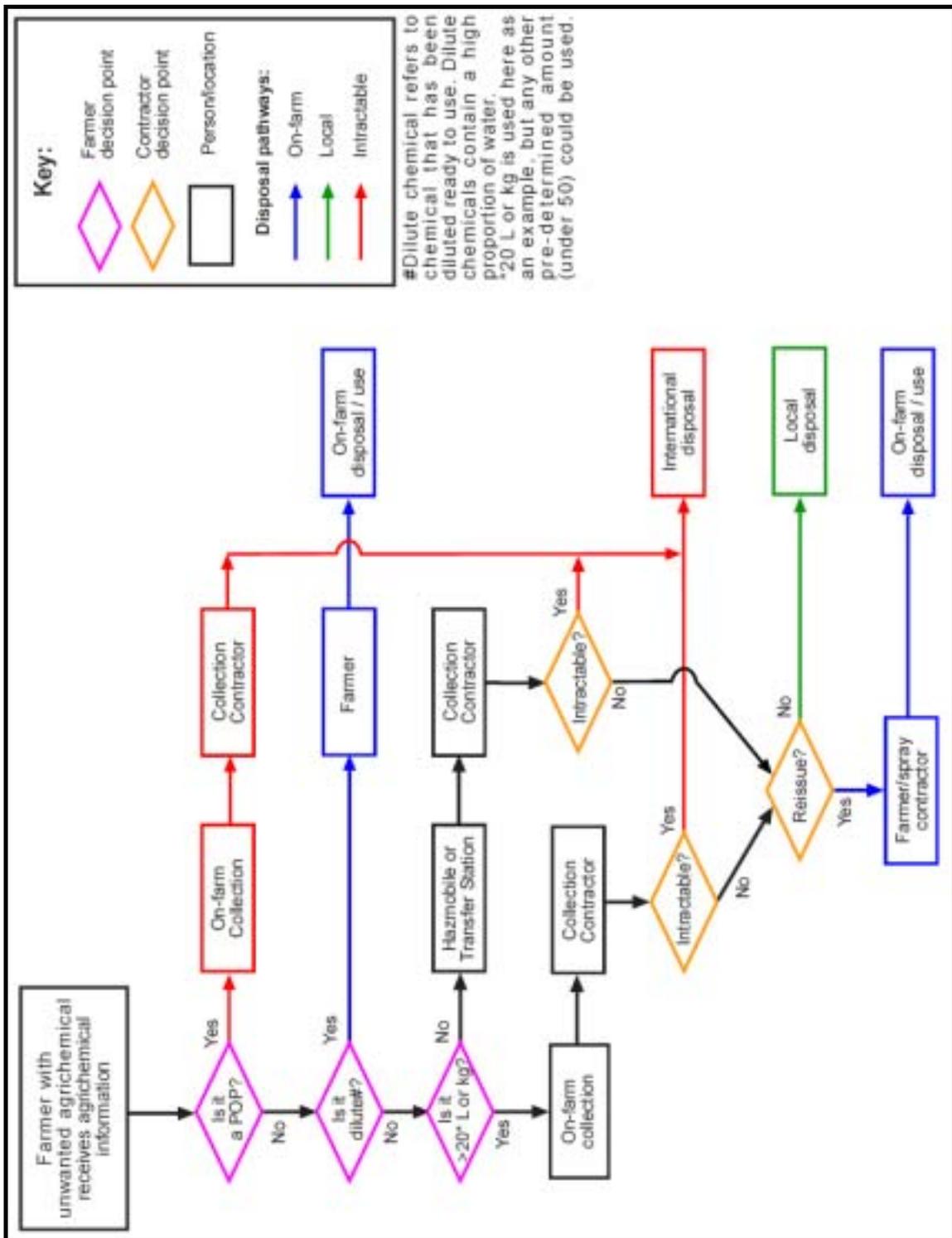


Figure 7: Flow diagram illustrating the collection and disposal pathway for unwanted agrichemicals as proposed under the strategy

Based on the proportions of participants during the Waitomo and Otorohanga collections in 2006-2007 submitting POPs or large volumes of agrichemicals, the necessity for on-farm collections would be around 6% of those farmers/growers surrendering agrichemical. Resources previously spent on contacting and collecting from individual properties may be directed to promotion of responsibility and collection by Hazmobile or transfer station collection.

6.4 Next steps for the Waikato region

It is proposed that Environment Waikato should undertake their next agrichemical collection in the Waipa District (see Figure 5). This is based on an assessment of the information in Appendix 1 along with cost estimates against the Environment Waikato

budget (for collection) and Ministry for the Environment funding (for disposal) for the 2007-2008 financial year. It is predicted that between 4.7-5.0 tonnes would be collected from the Waipa District and 100-150kg of this would be POPs.

It is estimated that of the 7 tonne disposal allocation from Ministry for the Environment for 2007-2008, a total of 2.8 tonnes will be collected from transfer stations; leaving approximately 4.2 tonnes of disposal allocation remaining. The estimated volume of agrichemical to be collected from the Waipa District would result in 500-800kg of agrichemical being stored until the 2008-2009 Ministry for the Environment funding allocation becomes available.

It is estimated that, at current Ministry for the Environment funding levels, it would take approximately three years beyond 2007-2008 to undertake active "spring-clean" collections, as described in Section 6.3, in each of the nine remaining districts in the Waikato region. This timeframe could work as the transition between the current collection system and a product stewardship programme, but will require a secure funding base for both collection and disposal to enact.

6.5 Product stewardship

The authors are in support of a move toward a product stewardship system and feel that this proposed strategy will work as a transition towards that goal. Product stewardship confers the responsibility for a product over its entire life to the manufacturer and the costs incurred for this responsibility will presumably be absorbed by the consumer in the form of agrichemical price increases.

Ministry for the Environment plans to register two new voluntary product stewardship schemes by June 2008 as part of its Product Stewardship legislation development (ME 2007). Used agrichemical containers are targeted in the first scheme: 'Agrecovery'¹⁰. Agrecovery appears to provide a model of where the government plans to take product stewardship, and could form the basis for an unwanted agrichemical product stewardship programme. Additional benefits may derive from co-managing unwanted agrichemicals and their containers, although some concerns do exist about the current success of Agrecovery (Regional Waste and Contaminated Land Forum, pers. comm., 2007).

While some aspects of the disposal of unwanted agrichemicals may fit the Agrecovery model well, the health, environmental and economic risks of non-compliance in the disposal of agrichemicals are much greater. Criticism of voluntary product stewardship schemes is that non-participants ('free loaders') stand to benefit financially by being able to price their products lower as they avoid the contributory costs. This would be particularly so for generic products¹¹ which are usually sold at reduced margins. Full industry participation is unlikely unless the system is transparent and appears to be fair to the participants. While there exists the opportunity to add value to a product by advertising a positive environmental commitment this is unlikely to offset the administrative costs of tracking a product from 'cradle to grave'.

Options for companies at the end of a product life are to either accept back unwanted product or, alternatively, contribute to the costs of safe disposal. The first scenario will require companies to set up facilities to collect unwanted product, probably at the point of sale (which may not be particularly appropriate). The second scenario would require a contribution to be made to the costs of collection and disposal through collectively managed/funded facilities. Historical data, recording product name and volumes, would allow a reasonable estimation of disposal streams to date allowing realistic budgeting.

'Fairness' has been identified as an important consideration in securing industry buy in to a voluntary product stewardship scheme. To ensure the issue of 'free loaders' does

¹⁰ More information regarding 'Agrecovery' can be found at <http://www.agrecovery.co.nz>

¹¹ Generic products, in this sense, refer to products which the patent has expired and copying is legal.

not unnecessarily detract from the adoption of the scheme, consideration should be given to the use of economic instruments to augment a voluntary scheme. These could include product charges, legislated deposit refund systems and performance bonds.

Whether participating companies choose to manage their unwanted products directly or choose to support a national scheme, there will need to be a period of transition from what is currently happening. The proposed withdrawal of central government financial support for the collection of unwanted agrichemicals in 2009 will probably foreshadow the collapse of the current initiatives and certainly does not allow time for all participants to buy in to a new collection system. In addition to this transition, acknowledgement must also be made for legacy agrichemicals which may not necessarily be included under a product stewardship programme. The historic legacy of agrichemicals in New Zealand is problematic in terms of product stewardship because these agrichemicals are no longer manufactured and the companies that once produced them may no longer exist. This leads to difficulties when attributing responsibility for their disposal costs. Because of difficulties attributing the costs of some agrichemicals it is suggested that there be a long-term passive collection system in place to deal with historic legacy agrichemicals that are not included in a product stewardship scheme.

The 'Agrecovery' scheme provides a useful product stewardship model from which an unwanted agrichemical scheme could be developed.

Involving commercial industry in the life cycle of its products may also open the door for opportunities for other industry and interest groups to be involved. Groups such as Fonterra, Federated Farmers, Horticulture New Zealand and smaller local groups such as WaiPAC and fruit growers associations have been involved in agriculture and horticulture since their inception, and have vast capabilities for bridging the gap between regional authority-run schemes and the farmers/growers themselves. These groups have stood by farmers/growers during the use of agrichemicals and will continue to stand by them when priorities regarding waste become more topical.

6.6 Key issues and actions

Below are listed the key issues relating to unwanted agrichemical collections, including those identified by the Resource Managers Group and those discussed throughout this report. Each issue has suggested actions that, if enacted, will work towards resolving the main issues relating to obsolete and legacy agrichemicals in the Waikato region. It is suggested that these also be raised with Ministry for the Environment, industry groups and farmer/grower advocates to explore what options exist to provide a New Zealand-wide agrichemical collection system.

6.6.1 Review estimates

Issue: A reliable estimate of the amount of obsolete and legacy agrichemical remaining in any region is important for a number of reasons: to measure compliance with international agreements, as an indicator of the amount of funding required to address the problem, and to assist with planning timeframes.

As discussed in Section 5, there are issues relating to the current estimates of agrichemical remaining in the Waikato region and other parts of the country. These issues relate to inconsistent and inappropriate methodologies behind the predictions and the lack of regional consistency with the estimations.

Given the unreliability of any of the estimation methods used to date (including those in this report), there remains one option to explore - to ask farmers/growers directly about the quantities and types of obsolete and legacy agrichemicals they have on their properties. A purpose-designed questionnaire directed specifically at farmers/growers and undertaken by a non-regulatory body could help work towards a more acceptable

estimate of what quantities actually remain. A draft questionnaire has been designed (attached in appendix 2) and trialled and the method appears feasible. More work is needed, however, to ensure that, if undertaken on a large scale, the questionnaire and process is as standardised as possible. There needs to be an implementation plan/survey strategy and rules around doing it to get good data.

Action: An implementation plan is developed to guide the proposed questionnaire to be successfully delivered to key farmer/grower focus groups. The results of the questionnaire should then be used to provide a better estimate of the obsolete and legacy agrichemicals remaining in the Waikato and, if extended nationally, the country.

6.6.2 Feasibility of proposed collection method

Issue: The collection method described in Section 6.3 relies on individual farmers/growers separating unwanted agrichemical into three categories and then disposing of each category differently. The requirement for farmers/growers to separate their agrichemicals into the three categories is crucial to the success of the collection method. However, their capability to do so is unknown. The ability of farmers/growers to separate their unwanted agrichemicals needs assessing before the strategy is taken any further. It is proposed that the questionnaire discussed in Section 6.6.1 may be a suitable means of testing the capability of the average farmer/grower to identify and separate agrichemicals to the required extent.

Action: Environment Waikato amends the proposed questionnaire so that it incorporates a section which will help determine the ability of farmers/growers to identify and separate agrichemicals.

6.6.3 Review designation-list

Issue: As discussed in Section 4, the agrichemical designation-list was revised in 2006 and this coincided with a reversal in the proportions (of local to intractable material) received at transfer stations. The implication of this is that the change may be due to the revision of the list – which has an effect on the cost of agrichemical collections.

The list requires revision both within the context of available facilities (treatment and disposal) and for rationalisation of disposal pathways. It is recommended that an independent body be assigned the task of identifying the national treatment and disposal capabilities for unwanted agrichemicals and matching these to a rationalised list identifying disposal pathways.

Action: Environment Waikato recommends to Ministry for the Environment, as funders of agrichemical disposal, that an independent review of the designation-list be undertaken.

6.6.4 Secure funding

Issue: As discussed in Section 1, current Ministry for the Environment funding for the disposal of unwanted agrichemicals runs out in 2009. It is recognised that in moving to a product stewardship system funding requirements and arrangements will need to be altered. It is recommended that this strategy is considered as a transition from the current system to a product stewardship programme and that funding be arranged to undertake this. Also, the low-cost long-term drop-off method proposed to be run alongside the future product stewardship programme to deal with legacy agrichemicals requires funding.

Action: Environment Waikato engages with Ministry for the Environment and other councils about the level and type of funding needed to provide security to councils to ensure the spring-clean type collection of unwanted agrichemicals continues.

6.6.5 Review collection contract

Issue: It is believed that with this proposed strategy there is a requirement for new contractual arrangements with the collection contractor. At present the price charged for collection is per kilogram collected. It is assumed that when collecting large volumes at this price, the revenue received by the contractor makes up for the lost revenue incurred when travelling large distances to collect small amounts of agrichemical. This strategy proposes that the farmers/growers with small amounts of agrichemical would be required to transport the agrichemical themselves. It is therefore proposed that the price per kg be renegotiated or an hourly rate plus costs be arranged to reflect the cost to the contractor of only collecting POPs and large quantities of agrichemical.

A new contract needs to be prepared between the regional council and the collection contractor. For transfer station and Hazmobile collections, an hourly rate plus costs arrangement is suggested, similar to the current transfer station collection arrangement. For the on-farm collections it is proposed that a price per kilogram is charged. However, this should be less than what is currently being charged.

Action: Environment Waikato staff develop a model contract addressing these issues and provide it to other regional councils.

6.6.6 Setup agrichemical collections

Issue: It is believed that the existing model of using transfer stations as drop-off points could be successful and run at little additional cost. However, it is imperative that transfer stations are adequately resourced to safely handle and store unwanted agrichemicals, and at this point in time, few transfer stations in the Waikato region meet this standard (see Section 3.1). There is also an issue that some transfer stations will not be able to cope with an increase in hazardous waste received and these will need to be upgraded if they are to be used as a part of this strategy. It may not be critical for the collection described here, because a Hazmobile could be used, but it is appropriate that transfer stations would be key drop-off locations and temporary storage points for unwanted agrichemicals in a product stewardship programme and long-term collection solution.

The authors strongly recommend that national funding allocations are considered with collection depots in mind, and that territorial local authorities are consulted on the gap between current resources and those required to improve their transfer stations. It may be that funding is required to allow transfer station dangerous goods stores to be upgraded to a condition that will assist this strategy and, more importantly, to allow for their use during a product stewardship programme. It is suggested that transfer station issues are addressed prior to any advertising or educational campaign to ensure that no undue risks to human health or the environment result from increased volumes received at transfer stations.

Actions:

- Environment Waikato identifies what transfer station upgrades are needed to meet the standards discussed in Section 3.1 and schedule these into their agrichemical collection project with details negotiated and agreed with their district councils.
- Environment Waikato staff raise this issue with Ministry for the Environment as a critical national concern if a future product stewardship scheme is reliant on farmers/growers dropping agrichemicals at transfer stations.

6.6.7 Provide agrichemical information

Issue: Current and concise information on POPs, obsolete and legacy agrichemicals, identification and handling of toxic materials, threats (environmental, health, economic) posed by these materials and their safe disposal is not readily available to the farming/growing community. Farmer/grower education regarding the identification and safe handling of unwanted agrichemicals is essential to the facilitation of this strategy. The education should not only convey technical information but also farmer/grower

responsibility for the safe disposal of obsolete and legacy agrichemicals helping to promote participation in the strategy. The information needs also to allow rudimentary identification of agrichemicals into the three categories described earlier in Section 6.

An awareness raising campaign needs to be devised to raise and maintain the profile of the risk of holding legacy agrichemicals and also of indiscriminate disposal of unwanted agrichemicals to the environment, export opportunities, stock and human health. The role of the collection depots and responsibilities of the farmer/grower should be emphasised. The information may take the form of a pamphlet, supplemented by a fact sheet, newspaper articles and radio presentations. Additional assistance may be obtained by working with and through industry partners such as Fonterra, Meat and Wool NZ, Horticulture NZ, etc and also Growsafe certification programmes.

Action: Environment Waikato explores with Ministry for the Environment and other agencies the development of appropriate agrichemical information that is simple to understand and contains all relevant detail as to the identification and safe handling of agrichemicals (particularly obsolete and legacy materials).

6.6.8 Undertake agrichemical collections

Issue: High volumes of agrichemicals collected from the Waitomo and Otorohanga Districts indicate that a final active collection clear-out of a district is needed before moving to a product stewardship programme and long-term passive collection. This will remove much of the historic legacy of agrichemicals remaining in a region. It is proposed that this service is offered as a one-off to farmers/growers in all districts in the Waikato region (excluding Waitomo and Otorohanga) and this service is offered for a limited time to each area, leading into the offer of a product stewardship programme and long-term passive collection system. Issues arising from recent collections indicate that, because of the uneven distribution of agrichemicals, on-farm collections are not necessarily the most feasible and a combination (between transfer station and Hazmobile collections with an on-farm option available for large quantities and POPs) is proposed.

Figure 7 indicates the proposed collection methodology. POPs, agrichemicals in volumes greater than 20 kilograms (or similar, see Section 6.3 for further discussion) or in leaking/damaged containers require on-farm collection; the farmer/grower would be responsible for contacting Environment Waikato who would confirm the material identification and organise the contractor to facilitate collection. Agrichemicals in volumes less than 20 kilograms (or similar) require transfer station or Hazmobile collections. It would be the responsibility of the farmer/grower to transport these to the collection depot. Diluted agrichemicals (that is, those that have been mixed with water ready for use) that have become obsolete are the responsibility of the farmer/grower to dispose of and in most instances disposal on the land in an appropriate way would be suitable.

Actions:

- Environment Waikato seeks feedback on the strategy from other councils to identify any further issues that the strategy may give rise to.
- Following this feedback, Environment Waikato adopts and implements the collection strategy outlined based on the risks posed by the agrichemicals held by farmers/growers.

6.6.9 Product stewardship programme

Issue: The Ministry for the Environment has indicated a move toward a product stewardship system. A move from current arrangements to a product stewardship system will require a transition period and it is believed that the three steps above will work well as this lead-in. Supplying information to the farmers/growers will raise the profile of correct disposal of agrichemical and the steps taken to prepare for an agrichemical collection (including possible upgrades of transfer stations) will prepare

drop-off points for the product stewardship system. The one-off collection discussed will hopefully account for the majority of the agrichemical legacy. However, any remaining legacy must still have a viable method of disposal available to farmers/growers. The historic legacy of agrichemicals in New Zealand is problematic in terms of product stewardship because the agrichemicals are no longer manufactured and the companies that once produced them may no longer exist. This leads to difficulties when attributing responsibility for their disposal costs. Product stewardship, by default, will take care only of newly obsolete and recently expired products and will not necessarily include legacy agrichemical.

Action: Environment Waikato continues to advocate for a national product stewardship programme to be initiated. This would need to follow a transition collection period and also be run alongside an ongoing passive collection service for legacy agrichemicals.

6.6.10 Audit system

Issue: Community participation in unwanted agrichemical collections or a product stewardship programme is critical to success. The strategy outlined, and any subsequent product stewardship programme, relies on a high degree of acceptance of legislation and reasonable actions by participants. Such reliance on voluntary participation will not capture all intended participants (importantly those with obsolete or legacy agrichemicals that they don't see as unwanted). A small proportion of farmers/growers will require additional incentives which could take the form of random audits.

EuroGap recently initiated these in the New Zealand horticultural export industry resulting in an increased focus by growers on their responsibility for pesticide management. Before our export markets for pastoral products do the same, it may be opportune to establish an internal audit procedure administered by the major exporters (Fonterra, Meat and Wool New Zealand, New Zealand Meat Board) or by the New Zealand Agrichemical Trust (who operate the Growsafe training programme) to enable them to invoke their own appropriate penalties for non-compliance.

Action: Environment Waikato explores with Ministry for the Environment and industry groups the feasibility of an internal audit system in New Zealand to help promote the safe disposal of obsolete and legacy agrichemicals.

6.6.11 National extension

Issue: As discussed in Section 1, the risks and problems associated with obsolete and legacy agrichemical are a national issue, but to date there has been limited coordination to deal with it. Because obsolete and legacy agrichemicals pose serious risks that are national in scale and importance, they should be looked at on a national level and dealt with in a coordinated way where possible. This could be through a national unwanted agrichemical collection programme based on the strategy proposed in Section 6.3.

Action: Environment Waikato to distribute this report to regional councils, Ministry for the Environment, key farmer/grower groups and key agrichemical education agencies and encourage taking a collaborative approach to implementing the agrichemical collection strategy.

6.6.12 Targets and monitoring

Issue: As discussed in Section 1, the removal of POPs and other obsolete and legacy agrichemicals is a national issue. There needs to be coordination in terms of targets, record keeping and reporting. A monitoring system needs to be in place to gauge, at the least, the success of this strategy, and also to measure compliance with international agreements such as the Stockholm Convention.

It is recommended that improvements are made in the monitoring and information storage systems within councils with the possibility of creating a national database, to a regional or district level, to record amounts collected and most recent estimates of the volumes remaining. As discussed in Section 5.4, the current 'clear' target (of having less than five tonnes per region) is questioned and it is proposed that new targets be created which take into account especially the size differences but also the different characteristics of different areas of New Zealand.

Actions:

- Environment Waikato to advocate for Ministry for the Environment to review the current targets which take into account the different sizes and characteristics of the regions.
- Environment Waikato to advocate for Ministry for the Environment to create a national database that records the most up-to-date information on the quantities of agrichemicals collected and the estimated quantities remaining in different parts of the country.

7 Conclusion

The information discussed in this report indicates that there are some key issues needing work to address both the immediate and ongoing issues and risks associated with obsolete and legacy agrichemicals. Importantly, the issues relating to agrichemicals exist throughout the country and the risks are national in importance. This report has identified a number of issues and areas that need addressing and some actions that could be taken to provide a more holistic management of the obsolete and legacy agrichemical issues, leading into a predominant product stewardship programme.

The current estimates of the quantities of obsolete and legacy agrichemical remaining on rural properties are not as accurate as desirable. This is primarily because they are based on the unwanted amounts collected to date and are not seen to be an accurate reflection of the problem. Ministry for the Environment estimates for different regions have both overestimated and underestimated the volume of agrichemicals to be recovered. This report gives an estimation of the amounts that could be collected in the Waikato, but again does not account for the obsolete and legacy agrichemical that is actually remaining on properties. The questionable nature of the current estimates results in caution being needed when reporting and questions subsequently arising over the accuracy of using them to measure compliance with Stockholm Convention targets. A more accurate way to estimate the amounts of obsolete and legacy agrichemicals remaining on rural properties may be to combine the current estimations with information sourced directly from farmers/growers.

Significant volumes of agrichemicals are being recovered in areas which have already been subject to a free on-farm collection. This illustrates the ongoing nature of the agrichemical issue and promotes the need for a long-term solution. The product stewardship solution proposed by the Ministry for the Environment is commended, but it is believed that there needs to be more of a focus on a transition to this system. This transition is needed for reasons including the ongoing nature of the problem and the existence of stockpiles of legacy agrichemicals. A long-term, permanent provision for the collection of unwanted agrichemicals is recommended.

There are both benefits and problems associated with the current collection methods. The need for personal communication with farmers/growers holding obsolete and legacy agrichemicals is seen to be very important, but at the same time, the need for on-farm collections is not necessarily a requirement. It is recommended that, especially for the Waikato region, a transfer station and Hazmobile collection system is offered, with an on-farm service available for large quantity and POPs. It is also important that attention is focused on other areas, especially infrastructure. If transfer stations are to be used as a primary means to receive agrichemical (both for product stewardship and

legacy collections) there are two key issues: the ability of the transfer station to adequately and safely receive increased amounts of agrichemical and the ability of the territorial local authority to handle increased promotion of its transfer stations. These need to be addressed if collections at transfer stations are to continue.

It is believed that by undertaking and extending the strategy outlined in this report, the current issues surrounding unwanted agrichemical collections will be addressed. However, a significant outstanding issue is the funding of the transition from the current arrangement to a product stewardship scheme. Certainty over the funding is critical to the longer term involvement of Environment Waikato (and other councils) in agrichemical collections and the successful achievement of Stockholm Convention targets. Furthermore, the strategy proposed is applicable in a national context and functions as a transition toward a product stewardship programme.

Glossary

Active agrichemical collection – An active agrichemical collection, as distinct from a *passive agrichemical collection*, involves a *regional council* prompting farmers/growers to participate in an *agrichemical collection*.

Active ingredient – An active ingredient is the part of a product which actually does what the product is designed to do. In any pesticide product, it is the component that kills, or otherwise controls, the target pest.

Agrichemical – Agrichemical, also agrochemical or agchem, is a contraction of the term agricultural chemical and is a collective term for the various *chemicals* used in agriculture and horticulture. For the purposes of this report, agrichemical includes: a broad range of pesticides (insecticides, herbicides, and fungicides), animal remedies and veterinary compounds, mineral oils and additives and *PCBs*. It does not include: detergents or disinfectants, dairy shed cleaners, sharp objects, asbestos, used oil or paint, petrol or diesel, batteries or explosives.

Agrichemical collection – Agrichemical collection refers to a method used to remove obsolete and unwanted agrichemicals from rural properties. There are three main methods discussed in this report: *on-farm*, *transfer station* and *Hazmobile agrichemical collections*.

Agrichemical fate / designation / disposal category – Agrichemical fate, designation or disposal category groups *agrichemicals* by their disposal pathway as identified by the *designation-list*. The agrichemical fate, designation or disposal category can be either *local* or *intractable agrichemicals*.

Agrichemical type – Agrichemical type is the collective category within which an *agrichemical* may be classified based on their use. Common agrichemical types are insecticide, pesticide, herbicide, veterinary compound and trace element.

Banned agrichemicals – Banned agrichemicals are those agrichemicals that are no longer legally allowed to be used.

Chemical – Chemical is a collective term relating to any material with a definite chemical composition. This report focuses on *agrichemicals*.

Chemwaste Industries Limited – Chemwaste provides collection, treatment and disposal services for of all types of solid and liquid hazardous waste.

Dangerous goods store – Dangerous goods stores are facilities at certain transfer stations where individuals can leave unwanted toxic materials including *agrichemicals*. Quantities accepted are generally restricted to volumes of less than 20 litres or kilograms that are then accumulated until the volume justifies its transportation to a treatment/disposal facility. Not all *transfer stations* have dangerous goods stores.

Deregistered agrichemical – Deregistered agrichemicals are those *agrichemicals* that are no longer registered for use. These are distinct from *banned agrichemicals* which are not legally allowed to be used.

Designation-list – The designation list is the nationally-applicable list that sets out the disposal pathway for *agrichemicals* in New Zealand. It sets out the two *disposal categories* for agrichemicals as *intractable* and *local agrichemical*.

Hazmobile agrichemical collection – A Hazmobile agrichemical collection is a type of *agrichemical collection* which involves the provision of a truck with specialist facilities to receive *unwanted agrichemicals* at predetermined rural locations.

Hazardous substance – A hazardous substance any substance with one or more of the following intrinsic hazardous properties: explosiveness, flammability, oxidising capacity, corrosiveness, toxicity and ecotoxicity.

Hazardous waste – Hazardous waste is a *hazardous substance* which is no longer needed or wanted; commonly left over after a task/process is completed.

Intractable agrichemical – Intractable agrichemicals are those *agrichemicals* that must (as required by Ministry for the Environment's *designation-list*) be shipped off-shore for treatment/disposal. Includes all POPs.

Legacy agrichemicals – Legacy agrichemicals refers to *agrichemicals* that have been kept by farmers/growers after becoming a *banned* or *deregistered*. Legacy agrichemicals may have been inherited from the previous land owner/occupier and/or accumulated by the current farmer/grower.

Local agrichemical – Local agrichemicals are those *agrichemicals* that can be (as determined by Ministry for the Environment's *designation-list*) treated and disposed of in New Zealand.

Medi-Chem Waste Service Ltd – Medi-Chem (now Transpacific Technical Services) specialises in handling, packing and transport of PCBs, pesticides and *POPs* for offshore disposal.

Ministry for the Environment – Ministry for the Environment.

Obsolete agrichemicals – Obsolete agrichemicals, distinct from *legacy agrichemicals*, are currently registered *agrichemicals* that are no longer wanted or required by farmers/growers and include chemicals that have recently passed their used-by date.

On-farm agrichemical collection – An on-farm agrichemical collection for *active collection*, involving arrangements being made (usually through a *regional council*) for a contractor to visit a rural property to collect *unwanted agrichemicals*.

Passive agrichemical collection – Passive agrichemical collections, as distinct from *active agrichemical collections*, occur when a land owner/occupier is not prompted by a *regional council* to safely dispose of *unwanted agrichemicals*. The two common types of passive agrichemical collection are *transfer station agrichemical collections* and *phone-in agrichemical collections*.

PCBs – Polychlorinated biphenyls (PCBs) were manufactured as cooling and insulating fluids for industrial transformers and capacitors, and also as stabilizing additives in flexible PVC coatings of electrical wiring and electronic components. PCB production was banned in the 1970s due to the high toxicity of most PCB congeners and mixtures. PCBs are classified as *POPs*, are difficult to destroy and persist in the environment.

Phone-in agrichemical collection – Phone-in agrichemical collections occur when a land owner/occupier calls their *regional council* requesting some *unwanted agrichemical* be collected. This service is usually for large amounts or where there is risk involved with the land owner/occupier transporting the agrichemical. Not all regional councils offer this service.

POPs – Persistent Organic Pollutants (POPs) are *hazardous substances* that have toxic properties, resist degradation in the environment, bioaccumulate through the food chain, and are transported through air, water and migratory species, within and across international boundaries. The Stockholm Convention identified 12 POPs: aldrin, chlordane, dichloro-diphenyl-trichloroethane (DDT), dieldrin, dioxins, endrin, furans,

heptachlor, hexachlorobenzene (HCB), mirex, *polychlorinated biphenyls (PCBs)* and toxaphene.

Properties GIS Layer – The properties GIS layer is a join of the LINZ CRS_PARCEL data (from the CRS (Core Record System) GIS layer) and the Valuation data as supplied from District Valuation Roll (extracted from the Environment Waikato LAND application). This is the GIS Layer which was used to source names and addresses of farmers/growers in the Waitomo and Otorohanga *agrichemical collections*, discussed in this report.

R and S McGregor Ltd – R and S McGregor Ltd is the *agrichemical* contractor that Environment Waikato currently employs to collect *unwanted agrichemicals*. R and S McGregor Ltd manages *on-farm*, *Hazmobile* and *transfer station agrichemical collections* and is employed by a number of other councils in New Zealand.

Regional Authority / Regional Council – Regional Councils, in terms of hazardous substances, have responsibility under the Resource Management Act 1991. In the Waikato, the Regional Council has taken on the role of managing the adverse effects from the storage, use and disposal of *agrichemicals*.

Reissue – Reissue refers to *agrichemicals* taken in as part of a collection being redistributed to other farmers/growers/spray contractors, under the condition they take full responsibility, in the form of signing a waiver, for the quality of the agrichemical they received. Reissues are at the discretion of the collection contractor and only accommodated under the Environment Waikato-funded disposal schemes. To date Ministry for the Environment contracts have precluded reissue.

Territorial Authority / District Council – Districts Councils, in terms of hazardous substances, have responsibility under both the Local Government Act 2002 and the Resource Management Act 1991. In the Waikato, District Councils have taken on the role of managing the adverse effects from the storage, use and disposal of household/domestic chemicals.

Transfer station – A transfer station is a site or facility that accepts waste for temporary storage or consolidation prior to shipment to a treatment facility/landfill. In New Zealand, these are primarily run by *Territorial Authorities* and sometimes have a *dangerous goods store*.

Transfer station agrichemical collection – A transfer station agrichemical collection is a type of *agrichemical collection* which involves farmers/growers bringing *unwanted agrichemicals* into a *transfer station* depot. A transfer station collection can be either a *passive* or *active* collection.

TTS (Transpacific Technical Services Limited) – TTS (previously Medi-Chem Waste Service Ltd) specialises in handling, packing and transport of PCBs, pesticides and POPs for offshore disposal.

Unknown agrichemicals – Unknown agrichemicals are *agrichemicals* for which the *active ingredient* is not recorded. This could be due to the information on the packaging having deteriorated to the extent as to be unreadable or the chemical having been put into another container.

Unwanted agrichemicals – Unwanted agrichemicals are those *agrichemicals* that a farmer/grower no longer wants and is willing to surrender for collection/disposal. They can include both *legacy* and *obsolete agrichemicals*.

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Appendix 1 – Methodology for estimating volumes of unwanted agrichemicals

Preparing farmer/grower numbers for projections

Data for the projections came from the Properties – GIS Layer database. For a certain district, the district boundary was used as a parameter and land use codes were queried within it. For this application, the land use codes queried were: primary industry, multi-use within primary industry, dairying, stock fattening, arable farming, store livestock, market gardens and orchards, and specialist livestock.

The list created from this exercise, however, includes a large number of double ups. In terms of the projection analysis, no attempt was made to create the distinct list (very time intensive) and, because of this, the number of farmers/growers identified by the CRS Properties query shows a misleading number of rural properties in each district. Therefore, instead of predicting the number of *properties* with agrichemical, the *quantity* of agrichemical for each district is predicted. Working backwards from this *quantity*, the number of *properties* from which the quantity was collected could be calculated.

To simplify the analysis, the eight chosen land use codes looked at collectively individually. The land use types were split into the two main agricultural land use types in the Waikato region – dairy and drystock. To make these two groups, the information from the Properties – GIS Layer database land use types was split to come under the two headings.

The dairy group included the following land use codes:

- Dairy

The drystock group included the following land use codes:

- stock fattening
- store livestock
- specialist livestock.

The other land use types were excluded from this projection¹². When grouping into dairy and drystock (and removing 'other') the proportions are 53% and 47%, respectively.

Using the method outlined above, Table A3.3 shows the number of properties for the primary land use types (dairy and drystock) for each district in the Waikato region, as at 2007. These are the farmer/grower numbers used for the projection methods 1 and 2.

Table A1.1: Primary land use (dairy and drystock) in the 12 districts of the Waikato region.

DISTRICT	DAIRY	DRYSTOCK	OTHER
FRANKLIN	439	1036	323
HAMILTON CITY	27	23	12
HAURAKI	1154	418	120
MATAMATA-PIAKO	2192	520	130
OTOROHANGA	1022	904	28
ROTORUA	536	286	11
SOUTH WAIKATO	746	279	62

¹² The reason for exclusion was that the number of collections in Waitomo and Otorohanga from these other land use types was very low or none at all. Also, the proportion of these farms in the whole region is very low; total about 6%.

TAUPO	175	496	52
THAMES-COROMANDEL	289	567	115
WAIKATO	1821	1568	100
WAIPA	1363	822	288
WAITOMO	198	1859	25
TOTAL	9962	8778	1266

Method 1 - Estimation by simple linear model

Two simple linear models were created from the data from the 2007 Waitomo and Otorohanga collections. One predicts the total volume of unwanted agrichemicals collected from the representative land use types (dairy and sheep/beef) and the other the volume of POPs on a proportional basis.

Based on the data from the Waitomo and Otorohanga collections a relationship between the proportion of sheep and beef farms (drystock) and amount of unwanted agrichemical was established (Figure A3.2) where $y = -2x + 5.9$, x being the proportion of sheep and beef farms and y being the total volume of unwanted agrichemicals.

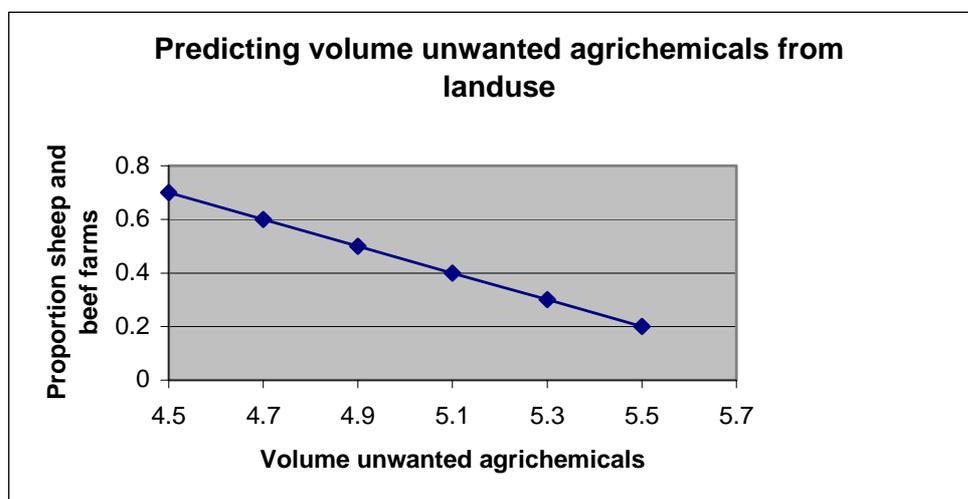


Figure A3.2: Relationship between land use and volume of unwanted agrichemicals based on data from the Waitomo and Otorohanga collections in 2007.

From the same data source the relationship between the proportion of sheep and beef farms (drystock) and amount of POPs collected was established (Figure A3.3) where $y = 10x - 1$, x being the proportion of sheep and beef farms and y being the proportion of POPs in the total volume of unwanted agrichemicals.

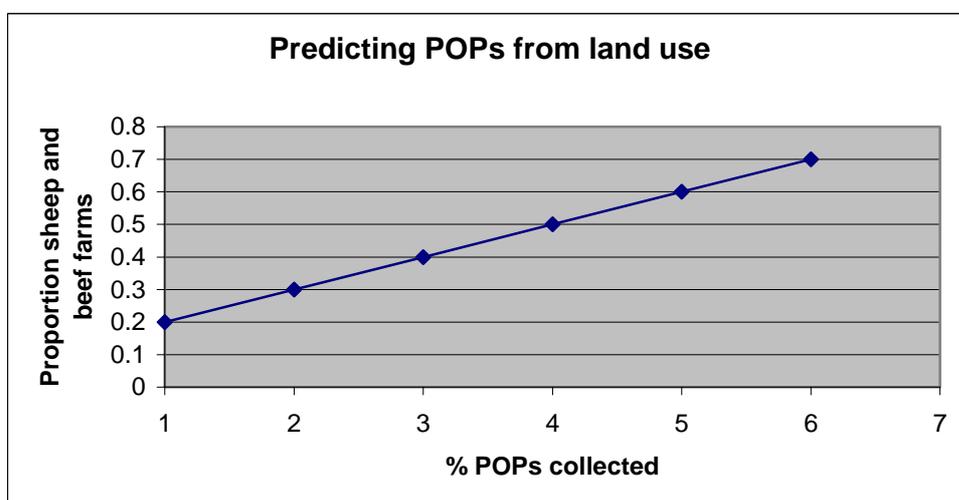


Figure A3.3: Relationship between land use and proportion of POPs in the volume of unwanted agrichemicals based on data from the Waitomo and Otorohanga collections in 2007.

The methodology is basic and no attempt has been made to separate the intractable from those suitable for local disposal. Any extrapolation to other districts within the Waikato region assumes that the collections from the Waitomo and Otorohanga areas removed all or nearly all POPs.

The estimations by district in the Waikato region exclude Waitomo and Otorohanga which received targeted collections in 2007. Included is a projection of a 10% and a 20% underestimation which indicate that even at the latter the volume of POPs remaining uncollected in the Waikato region (3.5 tonnes) is less than the regional target for the New Zealand NIP (Table A3.4).

Table A3.4: Estimation of the total volume of unwanted agrichemicals (tonnes) and POPs (kg) for the Waikato region

District	Total Volume (tonnes)	POPs (kg)	+10% Volume	+10% POP	+20% Volume	+20% POP
Franklin	3	190	5	316	11	633
Hamilton	0	4	0	7	0	14
Hauraki	4	67	7	111	13	222
Matamata-Piako	7	65	12	108	24	218
Rotorua	2	51	3	84	7	168
South Waikato	3	45	4	75	9	150
Taupo	1	90	2	150	5	301
Thames-Coromandel	2	105	3	174	6	349
Waikato	8	291	13	483	27	970
Waipa	5	148	9	246	18	493
Total	36	1056	59	1753	119	3517

Method 2 – Preparation (accounting for unknown land use)

In the course of confirming land use during the Waitomo and Otorohanga collections it was apparent that there were a number of properties collected from that the land use type was unknown. This occurred when information from farmers/growers registering didn't match the information in the database. For example, when John Smith at 123 Apple Road registered and this was cross-referenced with the database information there was no John Smith, 123 Apple Road. The information for this registration was therefore manually input rather than taken from the database. As the land use type (land use code) is gained from the database, the land use type for that farmer/grower was not known. Reasons for this varied but included spelling mistakes in names, slightly different addresses, and managers registering a property as their own. As there were very few 'other' types of land uses in both the Waitomo and Otorohanga collections they were also included in the unknown category.

Apportioning agrichemicals from properties with unknown land use

The proportion of each disposal class (including POPs) was calculated for the properties with *known* land use in the Waitomo and Otorohanga Districts (Table A3.4).

Table A3.4: The proportion and percentage of unwanted agrichemicals collected from properties with known land use in the Waitomo and Otorohanga Districts

Disposal	Waitomo		Otorohanga	
	DAIRY	DRYSTOCK	DAIRY	DRYSTOCK
Local	0.051374	0.948626	0.804285	0.195715
Intractable	0.019715	0.980285	0.566652	0.433348
TOTAL	0.027724	0.972276	0.676664	0.323336
POP	0.024661	0.975339	0.251969	0.748031

The total amounts of agrichemical collected from properties with *unknown* land use types are shown in the Table A3.5. These amounts were not insignificant in terms of the total amounts collected and were therefore separately (Waitomo and Otorohanga) factored into final estimations.

Table A3.5: Collections of unwanted agrichemicals from properties with an unknown land use type in the Otorohanga and Waitomo Districts of the Waikato region

Disposal	Waitomo kg	Otorohanga kg
Local	148.8	190
Intractable	468.3	205
Total	617.1	395
POPs	103	0

The proportions in Table A3.4 were used to apportion the amount of agrichemical in Table this is shown in Table A3.6.

Table A3.6: Apportioning of unwanted agrichemical (kg) collections to land use type where this was unknown.

Disposal	Waitomo		Otorohanga	
	DAIRY	DRYSTOCK	DAIRY	DRYSTOCK
Local	7.64	141.16	152.81	37.19
Intractable	9.23	459.07	116.16	88.84
Total	17.11	599.99	267.28	127.72
POPs	2.54	100.46	0.00	0.00

These amounts were added to the results from the known land use types for both districts.

Method 2 - Estimation by extrapolation

The results from both the Otorohanga and Waitomo Collections were used to estimate the quantities and disposal categories of unwanted agrichemicals remaining in the Waikato region.

The quantities of agrichemical collected from the two collections were separated by land use. These were then grouped as 'dairy' and 'drystock' following the methodology in section '*Simplifying*' above.

Table A3.7: Total volumes of unwanted agrichemicals collected in the Waitomo and Otorohanga areas in 2007 apportioned to the two classes of land use

	Waitomo			Otorohanga		
	DAIRY	DRYSTOCK	TOTAL	DAIRY	DRYSTOCK	TOTAL
Local	58.69	1083.81	1142.5	2052.21	499.39	2551.6
Intractable	67.08	3335.52	3402.6	1668.56	1276.04	2944.6
Total	126.01	4419.09	4545.1	3719.08	1777.12	5496.2
POPs	6.54	258.66	265.2	9.6	28.5	38.1
No. farms	198	1859	2057	1022	904	1926

The average volume of unwanted agrichemical per farmer/grower for each disposal category was calculated for both the Waitomo and Otorohanga areas (Table A3.8). It is important to note that this is not the average amount of agrichemical per farmer/grower collected from, rather it is the total amount of agrichemical divided by the *total number of rural properties in the district* as identified by the Properties – GIS Layer procedure (note POP is still included in Intractable).

Table A3.8: Average volumes (kg) per total number of farms, of unwanted agrichemicals collected in the Waitomo and Otorohanga areas in 2007 apportioned to the two classes of land use

	Waitomo		Otorohanga	
	DAIRY	DRYSTOCK	DAIRY	DRYSTOCK
Local	0.30	0.58	2.01	0.55
Intractable	0.34	1.79	1.63	1.41
Total	0.64	2.38	3.64	1.97
POPs	0.03	0.14	0.01	0.03

The data from Waitomo and Otorohanga was then combined to give the average over both districts.

Table A3.9: Average volume (kg) per total number of farms, of unwanted agrichemicals based on the combined data from the Waitomo and Otorohanga collections 2007

	DAIRY	DRYSTOCK
Local	1.15	0.57
Intractable	0.99	1.60
Total	2.14	2.17
POPs	0.02	0.09

Using the volume per total number of farmers/growers (Table A3.9) for each disposal category of unwanted agrichemical, the quantity and fate of agrichemicals a collection would receive from each district in the Waikato region were estimated.

Table A3.10: Estimation of the quantity and fate of agrichemicals a collection would receive from each district in the Waikato region

FRANKLIN	DAIRY	DRY	TOTAL
FARMS	439	1036	1475
LOCAL	506	588	1094
INTRACT	433	1661	2093
TOTAL	938	2250	3188
POP	9	88	98
HAMILTON CITY	DAIRY	DRY	TOTAL
FARMS	27	23	50
LOCAL	31	13	44
INTRACT	27	37	63
TOTAL	58	50	108
POP	1	2	3
HAURAKI	DAIRY	DRY	TOTAL
FARMS	1154	418	1572
LOCAL	1330	237	1567
INTRACT	1138	670	1808
TOTAL	2467	908	3375
POP	24	36	60
MATAMATA-PIAKO	DAIRY	DRY	TOTAL
FARMS	2192	520	2712
LOCAL	2526	295	2821
INTRACT	2161	834	2994
TOTAL	4686	1129	5815
POP	46	44	91
ROTORUA	DAIRY	DRY	TOTAL
FARMS	536	286	822
LOCAL	618	162	780
INTRACT	528	458	987

TOTAL	1146	621	1767
POP	11	24	36
SOUTH WAIKATO	DAIRY	DRY	TOTAL
FARMS	746	279	1025
LOCAL	860	158	1018
INTRACT	735	447	1183
TOTAL	1595	606	2201
POP	16	24	40
TAUPO	DAIRY	DRY	TOTAL
FARMS	175	496	671
LOCAL	202	282	483
INTRACT	173	795	968
TOTAL	374	1077	1451
POP	4	42	46
THAMES-COROMANDEL	DAIRY	DRY	TOTAL
FARMS	289	567	856
LOCAL	333	322	655
INTRACT	285	909	1194
TOTAL	618	1231	1849
POP	6	48	55
WAIKATO	DAIRY	DRY	TOTAL
FARMS	1821	1568	3389
LOCAL	2098	890	2988
INTRACT	1795	2513	4308
TOTAL	3893	3405	7298
POP	39	134	172
WAIPIA	DAIRY	DRY	TOTAL
FARMS	1363	822	2185
LOCAL	1570	467	2037
INTRACT	1344	1318	2661
TOTAL	2914	1785	4699
POP	29	70	99

Table A3.11: Totals of estimation of the quantity and fate of agrichemicals a collection would receive from each district in the Waikato region

	Waikato region		
	DAIRY	DRYSTOCK	TOTAL
FARMS (#)	8742	6015	14757
Local (tonnes)	10,074	3,414	13,487
Intractable (tonnes)	8,619	9,642	18,259
TOTAL (tonnes)	18,689	13,062	31,751
POPs (kgs)	185	512	700

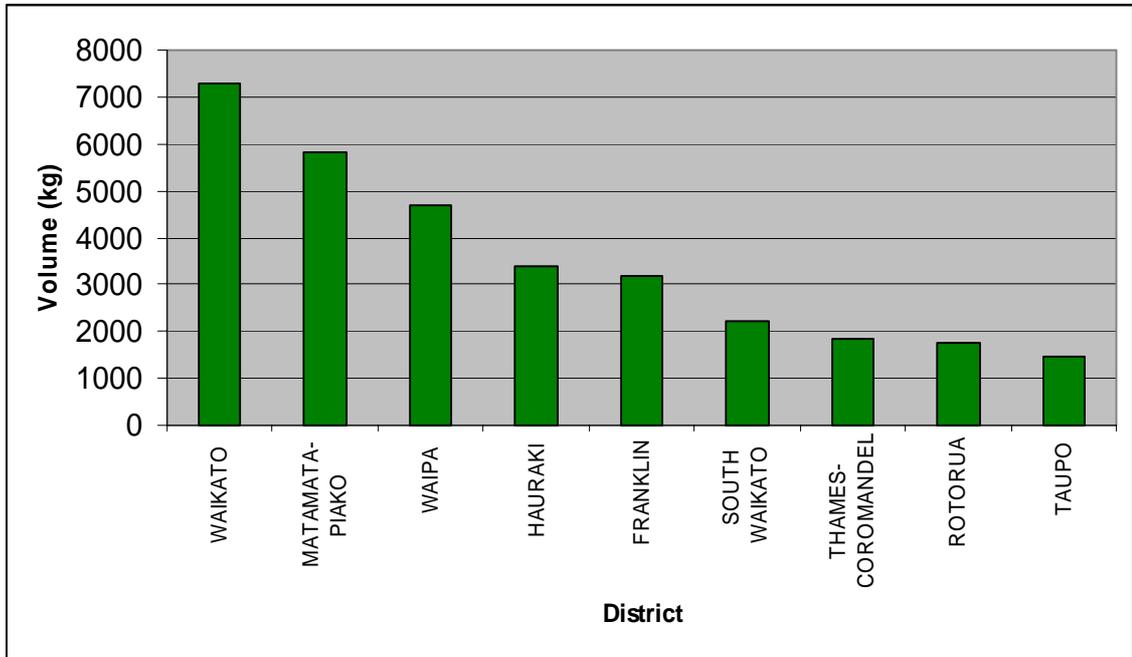


Figure A3.4: Estimation of the total quantity of agrichemicals a collection would receive from each district in the Waikato region

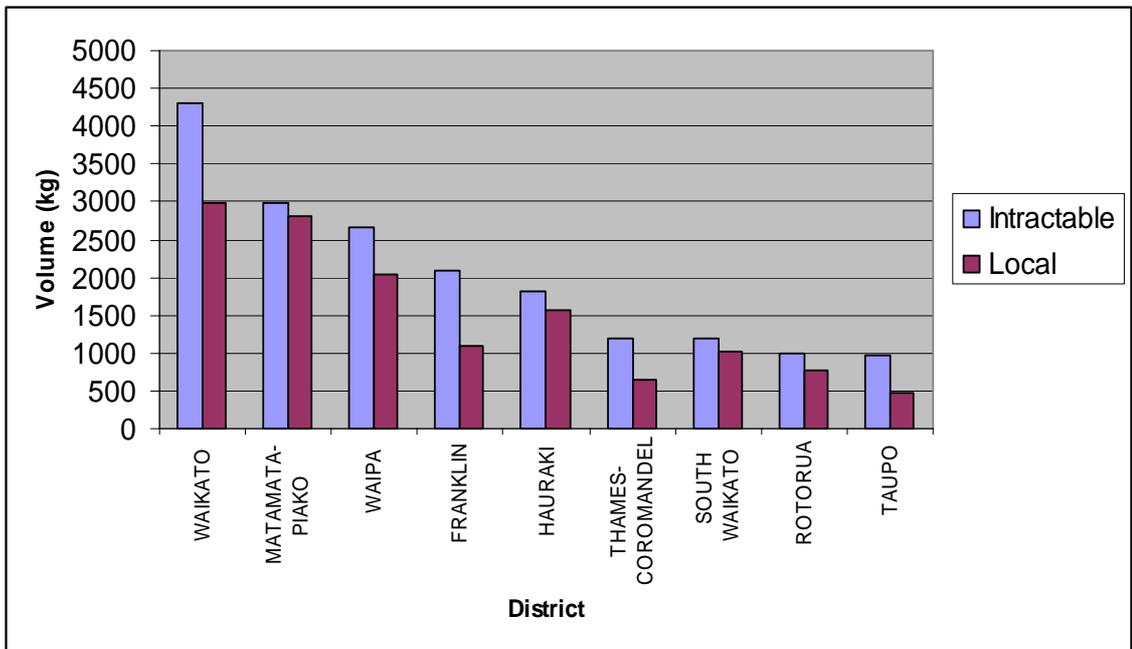


Figure A3.5: Estimation of the quantity of agrichemicals a collection would receive from each district in the Waikato region, by disposal category

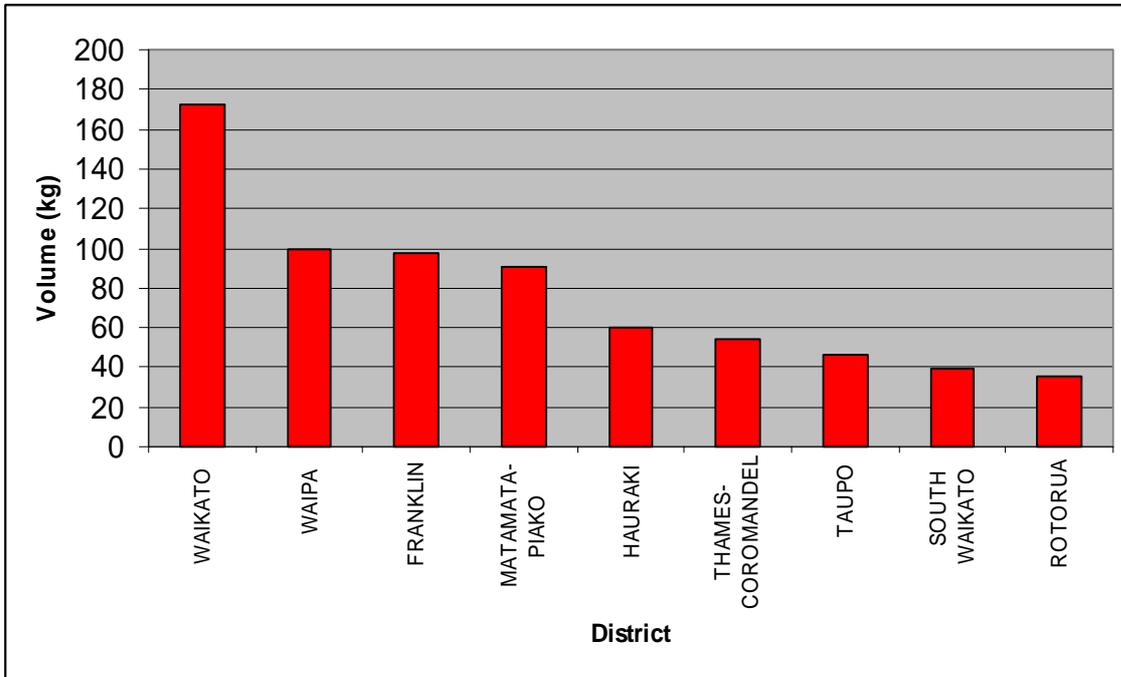


Figure A3.6: Estimation of the total quantity of POPs a collection would receive from each district in the Waikato region

Appendix 2 – Example questionnaire

Background

This questionnaire has been designed for the use of DEXCEL consultants in a farm group situation to be able to collect information on the presence of unwanted agrichemicals on farms. The information will enable the Ministry for the Environment working with Environment Waikato to plan the effective collection and disposal of these agrichemicals.

Unwanted agrichemicals include pesticides (herbicides, insecticides and fungicides) and animal remedies. Of particular concern are currently deregistered (obsolete) agrichemicals.

Deregistered agrichemicals pose both an environmental and economic risk. In bulk amounts (i.e. undiluted) they may if stored in decaying containers contaminate ground and/or run off water. Uptake through animals or plants will pose a health risk to our families and may jeopardise market access for our farm products.

Environment Waikato, supported in principle by Fonterra and Federated Farmers, conducted a free (no cost to farmers/growers) regional (Waikato) collection of unwanted agrichemicals in 1992-94 and a recent (2007) follow up collection in some areas. Data collected in the course of these collections does not form a clear picture of what quantity of unwanted agrichemicals may still remain in the region.

As a signatory to the Stockholm Convention New Zealand has committed to ensuring that by 2012 our country is rid of persistent organic pollutants (POPs). POPs are mainly deregistered pesticides such as DDT that persist in the environment. The idea is that by targeting all unwanted agrichemicals future problems posed by obsolete agrichemicals will be avoided.

Table of agrichemical POPs targeted for removal from New Zealand farms

Active ingredient	Trade names	Active ingredient	Trade names
DDT	DDT	other organochlorines	Dicofol, Aldrin
dichlone	Dichlor	endosulfan	Endosulphan
dieldrin	Dieldrix, Dieldrite25	captofol	Capfoltan, Difoltan

Low volumes of unwanted agrichemicals in recent collections indicate either there are little of these agrichemicals in the Waikato, farmers/growers do not want to participate or do not see the safe disposal of agrichemicals as a priority. Mail outs followed by telephone contact has resulted in a low (less than 10%) response for collection from farmers/growers. A system of disposal through specialist facilities at some regional transfer stations is also currently available. These facilities are little used; however, they are not designed to take large quantities of agrichemical.

In the future it has been proposed that companies selling agrichemicals would be involved to ensure that both agrichemicals and the containers will be tracked and disposal part of the commitment at sale. Agrichemical companies cannot be held responsible for current stocks of obsolete or unwanted agrichemicals. The onus is on the farmer/grower to ensure his/her property is clear of these potential contaminants.

Method

Facilitator introduces the topic, asks if there are any questions, and then completes the questionnaire (Q1 – Q12). Responses as a show of hands recorded as a number in the boxes provided in the questionnaire. It is important to reiterate that the results are

confidential and the sole objective is to get an idea as to how much unwanted agrichemicals are on farms to facilitate free removal.

UNWANTED AGRICHEMICALS QUESTIONNAIRE

Note: The responses to this questionnaire are to be recorded as the number in the group responding i.e. show of hands.

Date:

Consultant:

Group name:

Number surveyed:

Location (district e.g. Otorohanga, Waitomo):

Show of hands. Repeat any aspect that is unclear

1. Do you have any unwanted agrichemicals on your farm?

YES NO Don't know

2. What are these agrichemicals and what is the approx. total quantity (kgs or litres) using the categories.

Chemical type	Quantity			
	Small <1kg	Medium 1-20kg	Moderate 20-100kg	Large >100
Insecticides				
Herbicides				
Fungicides				
Animal remedies				
Unknown				
Mixed (i.e. diluted for use)				

Note: if a large quantity of unwanted agrichemical is identified please in confidence request details (property owner, location, contact telephone number) for free collection.

3. How long have they been on your property?

<5 years 5 – 10 years Don't know

4. Are the containers intact/moveable?

YES NO

5. If NO, are the containers?

Completely shot Pretty rough Dodgy

6. Are these agrichemicals safe for you to dispose?

Yes Rather not Definitely would rather not

7. Why have you not got rid of them before now?

- Forgot
 - Didn't get around to it
 - Didn't hear of the collection service
 - Just bought the farm
 - Thought they might come in handy
 - Other (specify)
-

8. Have you disposed of unwanted agrichemicals in the past?

YES NO

9. How?

Diluted and spread on pasture Dumped on farm

Local landfill Donated Council collection

Other (specify)

10. Do you know about the agrichemical disposal service at certain council transfer stations?

YES NO

11. Do you think that it is fair that companies selling agrichemicals should have some responsibility for disposal when these agrichemicals become obsolete?

YES NO

12. Any additional comments you wish to have recorded as to the disposal of unwanted agrichemicals?

Appendix 3 – Summary report post-questionnaire trial

“Background

Dexcel was requested in late May to trial a survey on unused chemicals by Bruce Willoughby, contractor for Environment Waikato. It was highlighted at the time that Dexcel’s extension delivery model had changed from geographic-based discussion groups (where a survey approach may have been more successful) to topic-based events where focus and participant make-up could make introducing a new topic difficult.

It was proposed to trial it in the Otorohanga area. However, the group selected to do it was no longer appropriate because the event already had two other invited presenters and a wide range in diverse topics – to introduce another topic would risk losing impact on key messages.

The Consulting Officer (CO) with four years experience was well positioned, knowing the individuals in the group and the process of adult learning to make that judgement call. The Consulting Officer resigned shortly after and no more groups were to be held in the area until September.

In consultation with Bruce Willoughby it was thought that another region would still be suitable to see if the survey would work.

Trial

The Central North Island CO team was asked if any had group events coming up that they may be able to use it. A CO volunteered to trial the survey at the next ‘calving catch-ups’ – again not judged as being an ideal forum.

A ‘catchup’ event with 18 farm owners, sharemilkers and farm staff from Kereone was undertaken. The survey was discussed with the group. The group indicated that they:

- *did not have all the information to hand to answer the survey questions*
- *would not have a problem doing the survey when they had the information but*
- *preferred another time of the year when they did not have so much going on.*

The CO was comfortable with carrying out the survey and confident in the information and suggested that a more appropriate time for gathering this sort of data would be November onwards.

Recommendations

Based on our experience to date, we conclude:

- *not all Dexcel activities are appropriate for collecting this survey data.*
- *July through to October is a very focused and busy period for farmers with limited time off farm.*
- *feedback suggests that farmers would like to have the questions in advance so that they knew what to look for in the way of unused chemicals before completing the survey.*
- *Fonterra’s annually on-farm audit provides an alternative mechanism for collecting survey information.”*

(J. Sheridan and W. McDonald, pers. comm., 2007)