Mayor Fred Eisenberger  
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Suite 230  
Hamilton Ont  
L8R-2K3  

URGENT-GYPSY MOTH SPRAYING  

Dear Mayor Eisenberger:  

Please find attached a report that we have recently received from New Zealand.  

This report summarises the published outcomes of two major investigations into the use of a Btk pesticide spray aerially applied over two New Zealand cities. It is the same spray that is being used here against the Gypsy Moth.  

In spite of the fact that the Reports (2, 3) of the New Zealand investigations were published in late 2007-well before the 2008 decision to spray Hamilton - neither Reports had been accessed or considered by our City or Public Health before endorsing the aerial spraying for the Gypsy Moth.  

Both the New Zealand investigations- one of official inquiry by their Parliamentary Ombudsman- raise significant health concerns about the spray. They both concluded that thousands of people experienced adverse health effects from the pesticide and that in many documented and verified cases these were not minor or transient.  

During their inquiries the authors examined not only direct evidence from the community and their Government, but as detailed in their Reports, critically reviewed a number of health studies, reports and assessments that have also not been taken into consideration in Canada.  

These new studies arising from the 2002-2004 aerial spray programmes in New Zealand are covered in detail in the summary report attached.  

The relevance to Hamilton is that these reports and studies include warnings that there should be no further aerial spraying of populated areas with this pesticide until scientifically robust long term follow up studies on exposed populations have been done.
As it is likely there will be further proposals to aerially apply this pesticide next year in Hamilton, we ask that the City Council consider this attached summary report as a matter of urgency with a view to investigate and putting in place alternatives control programmes as soon as possible.

We would be grateful for a hearing to present these reports to the City and its elected representatives.

Yours sincerely,

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(3) Dr. Goven, Dr. Kerns, Professor Quijano, Dell Wihongi. 2007. Report of the March 2006 Peoples Inquiry into the impacts and effects of aerial spraying pesticide over urban areas of Auckland.
GYPSY MOTH CONTROL PROGRAMME
HAMILTON, ONTARIO

Relevance of the New Zealand experience

In late 2007, two major Reports were published in New Zealand of independent investigations into the impacts and effects of eradication programmes undertaken in two New Zealand cities against invasive moth pests. Like Hamilton, Ontario, which has recently undergone a spring control programme against the Gypsy Moth, this involved the aerial spraying of urban areas with the *Bacillus thuringiensis var Kurstaki* (btk) pesticide in the commercial formula Foray 48B. As it is likely that Hamilton will experience further—possibly extended—aerial spraying programmes, consideration of the New Zealand experience and the findings and implications of these Reports is vital information for the community that may be subjected to this spray.

The most important finding of these two investigations is that the aerial spraying of the pesticide Foray 48B was not benign and harmless. Thousands of people experienced adverse health effects. In many documented and verified cases these were not minor or transient, and warnings are reported that until long term follow up studies on the exposed population are undertaken there should be no further aerial spraying of populated areas.

Arising from this conclusion of major and consistent health effects from the spraying, both Reports question why Foray 48B was endorsed and promoted as safe to use in the face of this conflicting evidence. The detailed examination of the process and evidence base used for both the health risk assessments and surveillance reports and the subsequent conduct of the government contracted health service provider during the spraying, resulted in a number of critical findings:

- There was a failure to monitor, measure or adequately characterise exposure
- There was an abdication of responsibility for human health protection in favour of biosecurity interests
- There were conflicts of interest. Surveillance and monitoring reports were not balanced, impartial or independent
- There was no recognition of the limitations of conventional risk assessment

These findings led to strong recommendations. This included that assessing and managing the health impacts of incursion responses must be independent of the eradicating agency. Further, that the human health data collected during these New Zealand programmes by the contracted medical service was unreliable, and should not form part of the evidence base for any future health risk assessments of Foray 48B or similar products.

This has significant implications for all communities like Hamilton, Ontario that might still be subject to this spray. All risk assessments for spray programmes rely heavily on data collected from previous surveillance studies and programmes. Most of the adverse health effects reported in New Zealand were discounted by public health and the government contracted health service provider. Evidence of an institutional dogma that the ‘spray is safe’ resulted over the years in most adverse spray effects being re-labelled as psychosomatic.
New Zealand's experience detailed in these two major Reports is therefore timely. The findings of these investigations not only expose and counter the inadequate data that risk assessors rely on, but the health implications are significant enough that action needs to be taken in Hamilton, Ontario as soon as possible to investigate and put in place changes for, or alternatives to aerial spraying of pesticide, for future control programmes for the Gypsy Moth.

BACKGROUND TO THE NEW ZEALAND EXPERIENCE

Three major aerial spraying programmes against moth pests have been carried out with the pesticide Foray 48B over heavily populated urban areas in New Zealand - the White Spotted Tussock Moth (WSTM) in East Auckland between 1996 and 1997 - (Operation Evergreen); West Auckland (Waitakere City) between 2002 and 2004 against the Painted Apple Moth (PAM); And in Hamilton City, Waikato in late 2003 against a presumed infestation of the Asian Gypsy Moth (AGM).

In conjunction with, and arising from these programmes, there has been a number of Government commissioned assessments and surveillance studies of the risks to the environment, economy and the health of the subject population. A further volume of reports, studies and investigations by other institutions, scientists and researchers have been published. The latest of these publications is the first of the 2007 reports noted above – The Report of the March 2006 People’s Inquiry. (Goven et al, 2007).

The authors of this Report are four independent Commissioners who heard the evidence at the People’s Inquiry into the impacts and effects of aerial spraying pesticide over urban areas of Auckland. The community had set up its own inquiry after failing to persuade the Government to review its two and a half year PAM spraying programme.¹

A month after the release of the People’s Inquiry Report was the publication in December 2007 of the Report of the Opinion of the Ombudsman on Complaints arising from Aerial Spraying of the Biological Insecticide Foray 48B. (Office of the Ombudsman 2007). This Report was the result of an independent four year investigation by the Government Ombudsman into complaints raised by members of the community. Indeed the Ombudsman reinforced his independence by noting in his conclusions that he did not take into account any material from the People’s Inquiry or its final report.

WHY ARE THESE TWO REPORTS IMPORTANT?

The findings of these two independent investigations are vitally important. Not only do the authors concur on many of their conclusions and recommendations, but they have both critically reviewed and evaluated many of the same government studies and assessments in that process. They examined these often contradictory official reports and documents and contrasted the assumptions and suppositions made in them with the detailed evidence of the impacts and effects presented to them.

¹ See the website: www.peoplesinquiry.co.nz for the full story, papers and submissions.
In the case of the People’s Inquiry, this included evidence from over 160 people of whom seventy gave public submissions on the effects of the spraying and were able to be closely questioned and examined by the commissioners, including a Professor of Medical Toxicology. In addition a number of relevant studies and reports by scientists and doctors were considered for the first time by the People’s Inquiry. These authors also gave evidence at the public hearings and faced strong questioning by the Commissioners.

The Ombudsman’s responsibilities and powers of investigation are fairly wide, and he notes that they are not confined to the strict details of the complaint laid with him. His access to Government and public servants and his ability to require even confidential documents and a response have ensured that his findings and conclusions are highly reliable and authoritative.

This thorough and conscientious evaluation of evidence by the professionals involved in both investigations, confirms the robustness of not only their resulting conclusions, but the validity or limitations of the material examined. It is a matter of concern that many authorities and public health departments use search criteria that fail to detect this area of ‘grey’ literature when conducting human health risk assessments (HRA), and therefore continue to rely on outdated, disputed or inadequate studies.

The relevance of New Zealand’s experience lies in the very nature of the aerial spraying campaigns conducted. All the NZ programmes have been on an unprecedented scale not experienced anywhere else in the world. The short and even overlapping time between these three eradications, coupled with the duration of the actual spraying has meant that impacts and effects became only too obvious over this timescale and could not so easily be dismissed or ignored as happens overseas where spraying may take place only a few days every year. This is not to belittle or discount the experience of these overseas communities like Hamilton, Ontario – rather - the result of the NZ experience detailed in these two documents corroborates and confirms the validity of the effects people have been reporting for years from Canada and the US where this same pesticide is used.

HOW HARMFUL IS THE SPRAY?
New reports and studies arising from the New Zealand programmes

Btk- based pesticide sprays have been marketed for over forty years as benign and toxicologically safe for everyone and everything except the targeted caterpillars. Even though the earliest study of an exposed population (Green et al, 1990) - often quoted as ‘proving’ safety - advised caution and further evaluation for immunocompromised persons, all subsequent studies have consistently ‘trivialised’ or dismissed reported adverse health effects. But as noted above, the very intensity of the New Zealand spray programme has exposed this rather weak foundation for claims of safety and non-effect.

The community has been documenting the adverse health effects of the aerial spraying campaigns in New Zealand since 1996, and an active database of residents is still maintained. Until the publication of two community reports in early 2003 exposing the inadequacy of the HRA to accurately predict effects of the spraying, the Government had never responded to community concerns. (Blackmore 2003, Watts 2003)
As the Ombudsman notes, up until that time “little attention seemed to have been paid to the possibility of human health impacts”, but after favourable peer reviews of the Blackmore and Watts Reports were received by the Government that changed.

The Ministry of Health (MoH), on behalf of the eradicating agency MAF, contracted the Wellington School of Medicine (WSM) to consult with the community and review the existing scientific knowledge relevant to their concerns and recommend what further studies may be needed. The Ombudsman concluded that in his view this was commissioned in the hope that it would satisfy the community.

“Having reviewed the material that does exist I am left with a strong feeling that this arrangement was made in haste as a response to the Blackmore and Watts reports which had been prepared in Auckland, and in the expectation by the Ministry that the appointment of the University would close off further protests from opponents of the spray programme.”

Wellington School of Medicine - Assessment of the Potential Health Impacts of the Painted Apple Moth Aerial Spraying Programme, 2004

The WSM Report (Hales et al, 2004) far from settling the matter was itself the subject of an extraordinary series of criticisms, political interference and attempts to prevent its publication. Both the Ombudsman and Commissioners’ Reports cover this story in some detail, and both come to the same conclusion that the WSM findings were of significance. Although the WSM authors had not been asked to assess whether the spray was safe, they considered that only further scientifically robust studies could answer that question, as existing scientific knowledge did not give a satisfactory level of assurance.

As part of his investigation, the Ombudsman had asked the authors what weight could be attached to their Report in view of the criticisms it had raised. Dr Hales the lead author had replied that:

"Ideally, the report should be reviewed by epidemiologists with experience in bioaerosol effects on respiratory diseases. I have tried, unsuccessfully, to achieve that. We have raised several important health concerns relating to the use of biologically-based insecticides in New Zealand. These relate, in particular, to a lack of adequate assurance of safety from existing scientific knowledge. In non-technical terms, these issues are as follows:

- Aerial spraying of Foray 48B produces fine particles of biological matter (bioaerosols) that may be inhaled.
- The level of exposure via this route is not well known and has not been measured in New Zealand.
- By analogy with exposure to bioaerosols in the workplace, insecticides based on bacteria or bacterial products could cause chronic health effects.
- Studies of exposed workers and communities have not shown serious health effects, BUT these studies have methodological weaknesses. 4
- Studies of workers and human cells in the laboratory have shown that the active ingredients of Foray 48B have measurable physiological effects, particularly on the immune system.
- The ERMA approval of a closely related biological insecticide was based, in part, on incorrect assumptions.

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2 MAF - The Ministry of Agriculture and Forestry
3 Report of the Opinion of the Ombudsman, para 46
4 Author emphasis in original
"The reviewers have been critical, but they have not seriously challenged these key points. Note that the reviewers were also supportive of the recommended epidemiological studies. .... "It may be an overstatement [reference to the Hamilton spraying] that a causal link can be definitely established on the basis of interviews alone. However, the range of symptoms is consistent with those reported by the Auckland community and in the literature. The frequency of the reported effects seems alarmingly high. This lends some support to the argument for undertaking detailed studies of the exposed populations in Auckland and in Hamilton.

"Note that we have not proved (or set out to prove) that the spray has caused or is causing serious health impacts. In public health terms, the most serious potential impact of the spray may well be a long-term effect on chronic diseases, especially respiratory diseases. We have raised questions about the level of assurance that can be derived from existing knowledge, and recommended scientifically robust methods of study that can answer the question of safety.

"I would be very pleased to learn, from the result of careful follow-up of exposed populations, that the spray has no serious chronic health effects. Until we have that assurance, it is my personal view that it would be prudent to avoid aerial spraying biological insecticides over populated areas."  

Dr Hales’ conclusion was echoed by the Ombudsman after reviewing the WSM Report and reports of other studies, when he stated

The coincidence of the similarity of these reported illnesses, for which no other logical explanation than exposure to the spray has been produced, leads me to the view that further detailed scientific investigation of this matter is desirable before any further mass spray operations are carried out.  

To date the follow-up studies recommended in the WSM Report to the MoH have not been done, although a study commissioned by the MoH a few months after the WSM Report was finally released by them, partially implemented one of the recommendations. It did not provide reassurance.

Institute of Environmental Science and Research - Study of hospital discharges for respiratory diseases in spray zone for Painted Apple Moth. 2005

The report from the Institute of Environmental Science and Research (ESR) compared acute hospital admissions for respiratory conditions before and during the period of the aerial spraying in Auckland. (Gallagher et al, 2005).

This report found statistically significant increases in asthma admissions in the Auckland spray zone, including a doubling of the rate for boys aged 0-4. Although the authors noted that the underlying trend had started before spraying, they concluded that "... there are several findings pointing to a real increase in asthma discharges that could plausibly be associated with the spray programme."

University of Otago, Spatial Information Research Centre Paper – Clustering of childhood asthma hospital admissions in New Zealand, 1999-2004. 2005

The lead author of the WSM Report went on to examine that underlying trend in more detail, and analysed childhood asthma admissions for the whole of New Zealand between 1999 and 2004 using a spatial scan statistic. (Hales et al, 2005).

The study confirmed that there was a significant space-time cluster of childhood asthma admissions in West Auckland during the period of the aerial spray operations. In other

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5 Ibid 15.16
6 Ibid 15.12
words, not only did the study confirm that there had been an increase in children admitted to hospital for asthma during the time of the aerial spraying, but these cases clustered in a defined geographical area, which in this case was the boundary of the aerial spray zone. The authors note that “the hypothesis that chronic exposure to biological insecticides may lead to asthma exacerbations deserves further study”.

Two papers were also published after the commencement of the aerial spraying against the Painted Apple Moth. The first covers aspects of the effect of bioaerosol exposure arising from the WSM study, and the second reports the outcomes of a survey published by the University of Auckland, Faculty of Medical and Health Sciences.

**EcoHealth Journal – Precautionary Health Risk Assessment: Case study of Biological Insecticides. 2004**

This case study (Hales 2004a) shows that both acute inflammatory responses and more prolonged symptoms like asthma exacerbation and skin rashes reported by the community after exposure to sprays like Foray 48B, are consistent with a number of studies of the adverse effects of bioaerosol exposure in workers. The study reports that this finding is at odds with the negative results of past studies in the community of these biological sprays which dismissed the pattern of self-reported symptoms.

Hales considers that the epidemiological studies of past urban aerial sprays that he examined have limitations and “do not provide strong evidence in support of the long-term safety of Bt products in a community setting”. (eg Noble 1992, Pearce 2002) Hales concludes that it would be prudent to avoid aerial spraying populated areas with biological insecticides until the result of detailed follow-up of exposed populations is available.

**New Zealand Medical Journal – symptom complaints following aerial spraying with biological insecticide Foray 48B – March 2003**

The study investigated self-reported symptoms of participants living in the initial PAM spray zone. It compared the changes in their symptom complaints from ten weeks prior to the spraying commencing and after three sprays had been completed. The study found symptom complaints increased significantly following the aerial spraying and concluded that “aerial spraying with Foray 48B is associated with some adverse health consequences in terms of significant increases in upper airway, gastrointestinal and neuropsychiatric symptoms, as well as a reduction in overall perception of health in the exposed population." (Petrie et al. 2003)

The Ombudsman notes that Petrie’s findings were not inconsistent with those anticipated in the HRA and confirmed in detail in the Blackmore Report. He went on to comment:

> While acknowledging the limitations of their survey, the authors expressed the opinion that it is not unreasonable to expect that exposure to spray containing Bt might cause health effects. Commercial sprays such as Foray 48B contain spores of Btk. as well as other ingredients, some of which appear to have been harmful to some people. One may question, therefore, the reliability of the oft-repeated assertions that Foray 48B is not harmful to humans. 7

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7 Ibid 13.45 – 13.46
There was also no reassurance of non-effect in other papers and documents commented on by the Ombudsman. Formal reports provided to him show that by March 2004 (27 months after the PAM spraying commenced) there were 3611 people registered with the PAM Health Service. Of these, 694 had Practical Support Plans (PSP) to help them avoid the effects of the aerial spray, and over 1000 had been assessed at least once by a doctor.

Table 4 (reproduced below) shows the number of people in the PAM spray area with PSPs whom the Government paid to evacuate each spray cycle to avoid the pesticide. The individual medical justifications for these people to receive this assistance included 250 people that had "severe to significant medical risks". 8

**Table 4 – Medical justification for practical Support Plans**

<table>
<thead>
<tr>
<th>Category</th>
<th>June 2003 – percentage – people (total 625)</th>
<th>March 2004 – applying similar percentage – people (total 693)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest severity</td>
<td>E.g. anaphylaxis to relevant foods, multiple severe food allergy in child, very severe asthma.</td>
<td>7% 44</td>
</tr>
<tr>
<td>Significant medical</td>
<td>E.g. definite or unstable asthma, eczema or upper respiratory with significant severity.</td>
<td>29% 181</td>
</tr>
<tr>
<td>Other medical</td>
<td>E.g. short-term irritant symptoms or mild respiratory, mild skin problems, headaches.</td>
<td>29% 181</td>
</tr>
<tr>
<td>Precautionary because of a previous medical diagnosis</td>
<td>E.g. a lower respiratory, alveolitis, emphysema, bronchiectasis, lichen planus, immune disorders, rheumatoid arthritis, SLE, past/current history of Chronic Fatigue Syndrome, and major medical problems not known to be at specific risk of aggravation by spray exposure.</td>
<td>19% 119</td>
</tr>
<tr>
<td>Mainly psychosocial justification</td>
<td>e.g. pregnancy or situational stress as justification, general concerns about spraying</td>
<td>16% 100</td>
</tr>
</tbody>
</table>

Whilst the risk of these adverse effects listed in the table above might be dismissed as simply the consequence of the repeated exposure and unprecedented duration of the PAM programme, this cannot be said of the aerial spraying against the Asian Gypsy Moth (AGM) in Hamilton, Waikato during late 2003. In this programme the risk for people sensitive or allergic to Foray 48B was clearly illustrated by an incident that is detailed at some length in the Ombudsman’s Report. 9

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8 Ibid 14.14
9 Ibid 13.64-13.75
Occupational Safety & Health - Final Report - Hamilton's Fraser High School - 2003

The Principal of a High School in the spray zone had brought in the Occupational Safety & Health service (OSH) after a number of his staff had experienced severe health reactions to the spray and he had been unable to get their concerns taken seriously. The report of the official investigation by OSH confirmed that over thirty staff had been adversely affected and that a significant number had serious reactions to the spray.

"...A causal link between adverse health effects and occupational exposure to Foray 48B has been established in a number of staff members ..... The investigation serves as a timely reminder for all practicable steps to be implemented to ensure safety and health within workplaces affected by an environmental programme ..." (OSH 2003)

The importance of this incident is that the investigation by OSH took place during the first sprays of the two month campaign, and the establishment of a causal link had been made by an independent medical expert. As the Ombudsman notes:

The OSH report is of some significance because it represents the only example of which I am aware of the making of a contemporaneous official investigation by OSH or any comparable agency. It establishes a clear link between exposure to the spray and the types of ailments which were reported in both Eastern and West Auckland. At the School there were perhaps 17 or so members of the staff who, in different ways, were particularly susceptible to the spray. It is noteworthy that these people did not live in the spray zone but were obliged to go into it in order to attend their employment. In addition to the 17 or so staff significantly affected, there were approximately another 20 who suffered some form of unwanted effect. 10

It should be noted that the interviews and examinations of staff at the school were carried out by an expert in the field of occupational safety and health, not the author of the OSH report. Dr Emrys was the Regional OSH Departmental Medical Practitioner, and it was his clinical opinion that the staff had been affected by components of the spray that had been identified to him.

People’s Inquiry Report – Assessment of the Health Effects of the PAM Spraying – 2007

Professor Quijano 11 a Commissioner and medical expert for the People’s Inquiry was also able to question people in the same close and impartial manner as Dr Emrys. Prof Quijano’s examination of the people who appeared before the commission during the five days of public hearings covered not only their written submissions and direct testimony about their claims of adverse effects from the pesticide spraying, but the physical, documentary and laboratory evidence presented. As the inquiry was conducted two years after the spraying had ended it also allowed an evaluation of any ongoing or chronic effects. His conclusion was unequivocal:

From the foregoing appraisal of available information and various types of evidence, it is clear beyond reasonable doubt that the aerial spraying of Foray 48B in Auckland, New Zealand has resulted in adverse health effects on the exposed population. 12

All these studies, assessments and direct examinations of the health effects from the aerial spraying of the pesticide Foray 48B in New Zealand lead to the same conclusion. The spray is not benign or harmless and the effects not just minor or transient. Whilst they all

10 Ibid 13.70
11 Commissioner Romeo Quijano is Professor of Medical Toxicology and Pharmacology at the University of the Philippines, and an expert on pesticide effects
acknowledge the limitations of their studies and recommend further evaluations and research, the lack of existing knowledge to support the long-term safety of the spray has led to some stronger cautions. This includes that until scientifically robust studies can provide assurances of safety, further urban aerial spraying programmes should not be undertaken.

HEALTH RISK ASSESSMENT vs EMPIRICAL EVIDENCE

The conclusions that the aerial spraying of Foray 48B resulted in thousands of people experiencing adverse health effects, some of them significant and of considerable concern, are at serious odds with the health risk assessments (HRA) for the New Zealand programmes that proclaimed “the spray is safe”. Both the Ombudsman and the Commissioners raise concerns about the failure of the HRAs to adequately predict the effects of the spray, particularly in view of the fact that tens of thousands of people would be involuntarily exposed to a spray whose contents they could not know or evaluate for themselves.

The predictive failure was compounded by the apparent inability of the government contracted health service providers to subsequently recognise and accept these ‘unforeseen’ effects when they arose. The two investigations detail their considerable disquiet about this. The Commissioners note:

The claim of safety suggests that MAF misunderstood the nature of the evidence on the effects of the spray. The absence of evidence is not evidence of absence (of effect), particularly in an under-researched area ... MAF should have been alert to the possibility of unforeseen effects and should have had contingency plans in place to deal with them, both by assisting those affected and re-assessing the spray programme. The PAM Health Service, which seems to have based its work on the same misunderstanding of the evidence for safety, and thus to have worked largely to a predetermined script describing what would be considered an effect of the spray, did not provide assistance for unforeseen effects. 13

Even when unequivocal evidence did arise as documented by both the Ombudsman and the Commissioners, the ‘predetermined script’ was maintained and no acknowledgement was made of the adverse effects being caused by the spray. As noted previously all risk assessments rely heavily on data collected during spray programmes. If these do not accurately record the adverse effects then all subsequent HRAs perpetuate this inadequate and unreliable data.

The authoritative report on the HRA process by Dr Watts noted above (Watts 2003) is discussed and quoted at length in both investigations and confirms the concerns. Dr Watts notes:

"[I]n this succession of reports, involving some of the same authors, there is a discernible tendency to confirm previous findings, rather than to question them in the face of contradictory community reports"... 14

... If the value bias were to be in favour of public health, or even neutral, the Health Risk Assessment would have looked more closely at the health effects reported from previous occasions, instead of dismissing them because they are unproven. There is no adequate

13 Ibid 1.5.1 pp 32
14 Ibid 4.3.3 pp 58
explanation of the effects reported by the community during Operation Ever Green; they have been simply discounted because they do not fit with the method chosen to determine if there was any effect... Similar effects have also been experienced in previous overseas aerial spray operations, and are again in West Auckland, but each time they are discounted. ... Where one piece of literature dismisses community reports, so another one cites this report as support for the belief that there won’t be any health effects of this nature.  

In one of the most compelling statements to come out of these two investigations, the Commissioners recommend in their Report that the data collected by the Government’s Health Service provider should not form part of the evidence base for any future HRAs of Foray 48B or similar products.  

This strong recommendation arose from the Commissioners’ criticisms about the deficiencies in the health support service for the people affected by the spraying, which in their opinion may have been compounded by the same company being contracted to provide the monitoring service as well.

"The primary basis for the monitoring report was the statistical data accumulated by the Aerqua health support service. In other words, an overly restrictive screening process would have distorted the reporting of health impacts: if Aerqua personnel did not accept the symptoms as spray-related, they did not show up in the data. We also heard from many, including a local [doctor] that most affected residents did not go to Aerqua, either because they did not associate their symptoms with the spray or because they had heard of others’ bad experiences."  

The Ombudsman confirms this plausible explanation for the failure to report adverse effects when he notes that there had been debate in government papers about the apparent falling away of reported ailments during the latter part of the AGM programme.

There may have been many reasons for the reduction in complaints, including dissatisfaction with the AGM Medical Service recorded in the OSH report, and, according to that report, acknowledged by Dr Kelly.  

The Ombudsman also expresses concern about the apparent playing down of health effects arising from the earlier 1996/97 Operation Evergreen aerial spraying. He had noted that 375 people had reported a variety of symptoms, all of which “fell within the parameters anticipated in the relevant HRA.” The Ministry’s criticism of this statement in his draft report is robustly defended.

In its reply to my draft Report MAF points out this is consistent with the advice received by MAF, and with its messages to Ministers and the public. It is said that elsewhere in my Report my opinion has been premised on a contrary view. However, that is not so. The symptoms per se are not the issue. The issues are extent and severity, both of which may have been played down, and the consistency of which must surely rule-out any suggestion of coincidence, leading to the conclusion that such reactions are to be expected and are not to be written down. It seems to me that the coincidence and consistency of events can be said to move the balance of causation from "doubtful/possible" to "probable". 

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17 Aerqua is the company name of the Government contracted Health Service provider
18 Ibid 1.1 pp 19
19 Report of the Opinion of the Ombudsman 15.36
20 Dr Kelly is the Director of Aerqua and head of the Government contracted Health Service
21 Ibid 13.2
The concerns expressed by the Commissioners about ‘selective’ data being used to deny adverse effects were fully justified. They report that instead of the proposed empirical studies recommended by the Government appointed Health Advisory Group, the only publications arising from the programmes were analyses by Aeraqua of the data collected by its own health service.

Aeraqua’s claim that this data showed that “the spray programme did not result in any new-onset illnesses or any exacerbations of existing illness” was firmly rejected by the Commissioners. Validating Dr Watts’ observations noted above, the Aeraqua Report was rapidly quoted in a further study in support of its assertion that Foray 48B did not cause any health effects. The commissioners note:

The DiMarco report (DiMarco 2006) assessing the health effects of aerially spraying Foray48B has used the Aeraqua report as the basis for some of its conclusions. The report states: “Health studies undertaken in New Zealand suggest that while the spraying programmes are associated with increased community concerns about their health, the evidence does not support a causative link between Foray48B and the reported health effects.” (p 17) 22

The Aeraqua analysis of the AGM programme actually notes that this toxicologist [DiMarco] does not believe that any amount of Foray 48B is sufficient to cause any effect:

[Di Marco, 2003] concluded that the community in the area to be sprayed were unlikely to be exposed (via any route) to an amount of Foray 48B sufficient to cause adverse effects on health. Additionally, the estimated exposures were too low to cause irritation of mucous membranes, eyes or skin which is the only clearly demonstrated hazard of Foray 48B. 23

The Commissioners comment that the persistence of belief in the ‘safety’ of Foray48B appeared to have become “an article of faith, difficult to dislodge by empirical evidence to the contrary.” Instead, an alternative theory is presented by these two authors above, that the spray effects reported by the people to the health service provider were primarily psychological. The Commissioners note:

The 2005 Aeraqua health monitoring report (Aeraqua 2005) supports the conclusions of the 2002 Health Risk Assessment (which in turn supported the previous work of Aeraqua and its earlier incarnation, Jenner Consultants) that the use of Foray48B was “generally safe for the public” and instead attributes reported health effects primarily to psychological factors. These factors include “attitudes and opinions”, the stress stemming from the incorrect belief that they have been exposed to something harmful, and personality types high in “negative affectivity” (pp 123-124). Stress and anxiety are seen as particularly relevant (pp127-128) and are said to be likely to have been caused by “disinformation”, or “extensive reporting by the media of the protest movement, promoting the view of detrimental effects of ground and aerial spraying in pest control.” 24

This premise was not only soundly rejected by the Commissioners who noted there was “no empirical evidence offered to support the conclusion that the experienced health impacts in this case were a result of psychosomatic responses,” but reinforced this rejection with two strong recommendations:

R14. The attribution of health effects reported by the community to psychosomatic processes should be given no credence in future risk assessments unless and until such a diagnosis can be supported with empirical, medical evidence.

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22 Report of the March 2006 People’s Inquiry – 2.1.2 pp38
23 GMH Health Service Epidemiology, June 2005, p18
24 Report of the March 2006 People’s Inquiry – 2.1.2 pp38
R15. Symptoms should not be dismissed as psychosomatic simply because their nature and pattern does not fit what the assessor expected based on past risk assessments, particularly where the level of exposure is unusual (e.g., long-term, repeated exposure of an urban population to Foray48B). 25

The Ombudsman similarly notes elsewhere in replying to criticisms about the WSM Report, that even though that Report may not have reported different or additional symptoms from those previously recorded, he thought that it was significant that it tended to confirm the complaints. Further he notes that “from all of the information available to me they cannot be dismissed as imagination or exaggeration.”

AERIAL SPRAYING, DRIFT & EXPOSURE

Unlike carefully targeted agricultural applications over crops or orchards, the very nature of an urban aerial spray application is that it is indiscriminate. Everyone from babies to the immune compromised, sick or elderly is equally exposed.

People’s Inquiry Commissioner, Dr Tom Kerns, points out the serious anomaly presented by regulations that are designed to protect pesticide spray operators, but not the people being sprayed in urban situations. 26 He shows that the labels for Foray 48B detail the health and safety regulations for workers which not only require them to wear protective clothing and even respirators while applying the spray, but cautions that workers should not re-enter the spray area for 4 hours. As Dr Kerns notes, “[t]he inconsistency of requiring applicators to wear protective clothing while spraying the insecticide on adults and children who were not wearing protective clothing is here noted.”

In this circumstance where people are living and sleeping in the spray zone and there is no mechanism to target only vegetation or prevent the spray entering buildings, the ability to accurately measure exposure and persistence is vital, both for avoidance and protection of the vulnerable, and the assessment of reported effects.

As noted by both investigations, not only was the exposure experienced in Auckland and Hamilton well outside the parameters of the Health Risk Assessment (HRA) predictions, but there was no spray monitoring, assessment or measurement of exposure at any time before, during or after the programmes.

We heard testimony that explicit requests to Auckland Public Health and MAF to carry out baseline health studies before the aerial spraying began, and exposure studies during the spray programme, were rejected on the grounds that “it would be difficult for us to justify spending substantial government funds in this area when we are being told by the health experts we have commissioned …that there [are no effects].”

This is surprising, as all assessments of health risk as well as epidemiological studies of effects need accurate information regarding exposure. We have already seen that the Auckland Public Health risk assessment of 2002 was based on what turned out to be inaccurate assumptions regarding likely exposure. Given the volume of health complaints arising, it is difficult to understand why no attempt was made to measure actual human exposures during the two-and-a-half years of the spray programme 27

25 Ibid pp 39
26 Ibid 5.4.3 pp 84-87
27 Ibid 2.1.4 pp 37
It is important to understand what is being discussed here, because exposure is frequently defined in HRAs and epidemiology studies as dermal contact with the spray. The possible exposure of the spray is further defined by calculating the maximum geographical distance the spray might drift. The definition of drift is equally confusing. Government authorities such as MAF or Public Health usually refer to drift only as the deposition of spray droplets on the ground outside the target spray zone. The term as used here refers to the aerosol particles which are so fine they are invisible to the naked eye.

An extensive study in Vancouver, Canada (Teschke et al 2001)\(^28\), indicated that these fine aerosols are produced during aerial spraying. Being much lighter they do not reach the ground immediately but can remain airborne enabling them to drift considerable distances on the wind and thermal air currents to impact some distance from the spray zone. As detailed in the study, these aerosols also penetrate deep into buildings where they appeared to persist much longer than those outside.

The Ombudsman reports that NZ studies supplied to him by the Government show that spray drift is said to be “the biggest issue with application of Btk, especially from the air”. Studies quoted by the Ombudsman and Commissioners show that up to 60 percent of aerially applied pesticide can drift out of the spray zone, and foliage was still found to be toxic [to caterpillars] 3 km from the application zone. Information quoted from the Teschke study above showed quite clearly that spray drift outside the target zone would go much further, penetrate buildings to a greater degree and persist for far longer, than previously recognised.

[This] study showed that outdoor exposures are highest two to three hours after spraying, while indoor Btk concentrations exceeded outdoor concentrations five to six hours after spray, and that significant levels of drift (up to 4 km) outside the spray zone had occurred. On a windy day even higher Btk concentrations were found outside the spray zone that inside the spray zone.\(^29\)

The research also shows that the spray that penetrates buildings may be composed of the smallest aerosols that take much longer to settle out of the air, and this migration indoors takes place whatever the type of house or building. The ability for the spray particles to build up over time on flooring, furnishing and bedding etc, where they could continue to be inhaled and ingested is unknown. The studies recommended by Teschke on indoor spray dissipation and persistence were never done.\(^30\)

But the OSH case detailed above involving the Hamilton high school provided convincing evidence in support of speculations about indoor exposure. The incident confirmed that the adverse effects experienced by staff were as a result of indirect exposure. Not dermal contact, not ingestion, but by inhalation inside the school buildings.

The spray not only penetrated the school as fine aerosols, but its components were still at sufficient volume or concentration to cause severe health reactions and adverse effects in the 18% of staff affected. A return of symptoms was also reported by staff members on re-

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\(^28\) This study was part of a series of studies conducted for the Capital Health Region. See “Airborne Exposures to *Bacillus thuringiensis* var. *kurstaki* During Gypsy Moth Eradication” (Teschke et al, May 2000) for the full Report.

\(^29\) Report of the Ombudsman 13.52

\(^30\) For example - how factors such as the movement of people in and out of buildings affect indoor spray concentrations (Teschke et al 2000).
entering the school in the days after spraying had occurred.\textsuperscript{31} As this was severe enough to prevent them continuing at work, a high degree of spray persistence would have had to exist.

The evidence from the OSH Report clearly shows that the AGM Doctors failed to establish or recognise these people were being exposed to the spray in their workplace until after OSH had been brought in to investigate. It was only the fact that a significant number of the staff members had allergies to a known component of the spray that the causal link was confirmed and accepted by the AGM Health Service.

"... it was agreed by the doctors that it is indeed extraordinary to have such a large cohort associated with a fish allergy. All were known to MAF, but the system in place failed to report that they all worked in the same place." \textsuperscript{32}

The conclusion that the ‘system’ failed to identify a common workplace clouds the issue. Although each individual was known to the AGM Health Service as being at risk, they were not identified as being exposed because they lived outside the spray zone. The ‘criteria’ for being registered as exposed was to have a residential address in the spray zone. This singular definition of exposure could have had serious consequences for the people who had life-threatening allergies.

Given this risk for the most susceptible in the population, it is difficult to understand why exposure at work was not even factored into medical interviews or officially recognised until this incident, even though the same government consultants had been diagnosing, recording and reporting the NZ health effects of the spraying since 1996.

Furthermore, as this incident is probably the first recorded and proven case of indirect inhalation exposure causing adverse health effects why was urgent action not taken during the remaining month of spraying to actually measure the mechanisms of spray penetration at this school, and the inside concentrations and persistence levels that were causing these adverse reactions?

This is vital and valid scientific information that would have advanced knowledge and enhanced protective measures for the staff and students in the ongoing spraying. As pointed out by Hales in his communication with the Ombudsman above, the level of exposure via inhalation to the fine particles of biological matter in Foray 48B is not well known and had not been measured in New Zealand.

Scientifically sampling and measuring the spray particulates could also have been one of the practicable steps recommended by the OSH investigator to ensure the future health and safety of everyone subject to an environmental programme like this. But as the Ombudsman notes with regret, this opportunity was missed.

\begin{itemize}
\item In response to my enquiry as to what action had been taken regarding the recommendation by OSH cited above I have been informed by the Ministry of Health that as it has no responsibility or accountability for occupational health and safety, apparently as a consequence of the Health and Safety in Employment Act 1992, it has taken no action on the recommendation. Consequently, it would appear that a potentially useful piece of evidence has been ignored. \textsuperscript{33}
\end{itemize}

\textsuperscript{31} Waikato Times reports – July 2004
\textsuperscript{32} OSH Report 5.14 p 9
\textsuperscript{33} Report of the Ombudsman 13.75
Even in the absence of any exposure study or measurement at the school – or elsewhere in NZ - the facts cannot be disputed. The spray that penetrated the school buildings was at a sufficient volume, and level of persistence, to cause significant adverse health effects not only to the highly susceptible, but the general population employed at the school – and by extrapolation - everyone in the wider ‘un-investigated’ spray zone.

As these effects would have been from the lowest possible volume of spray and by the most indirect route from indoor exposure, Public Health advice to communities like Hamilton, Ontario to remain outdoors to avoid spray exposure can no longer be considered reliable or safe.

What is also unacknowledged by risk assessors is that unlike workers (even spray operators) who can go home at the end of the day to a spray free environment, even the most vulnerable of residents in a spray zone will be living and sleeping in an unknown concentration of pesticide for twenty hours a day. Under these circumstances how long the spray components persist in the environment, and in what form, becomes an important consideration.

An indication is given in research published in 2003 (Vettori et al 2003a) which shows that Btk can persist in the soil for at least 88 months and its toxin for 28 months. The authors show in further research at the same site (Vettori et al 2003b), that after five years they had detected a genetic exchange between the spray-introduced Btk and indigenous bacteria. The authors comment that these results indicated that it was the very persistence of the Btk that favoured this gene transfer.

What is of concern for communities like Hamilton, Ontario is that this transfer occurred not in a laboratory or in a genetically engineered crop but under normal field conditions that are identical to the programmes carried out in Canada - an annual spray with the commercial product Foray 48B.

In the light of this evidence, and where the persistence of the spray in urban conditions in homes, schools or businesses has never been studied or measured, caution is warranted.

No active sampling was done during the AGM spraying in Hamilton or the PAM in Auckland and the follow-up studies recommended by Teschke on indoor spray dissipation and persistence have never been carried out. As the goal of the Teschke study was to “provide data that would allow public health authorities to advise the public about methods to minimise exposure” it is to be regretted that they have never been done.

In the absence of this data and any practicable information to guide public protection that would have been provided by these follow up studies, avoidance is the only option. In this circumstance it would be prudent to take the precautionary advice of an expert like Dr Hales and avoid aerial spraying of urban areas altogether.

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34 Dr Simon Hales is a medically qualified epidemiologist specialising in the field of atmospheric environment, including climatic and air pollution effects. He has acted as an adviser to the World Health Organisation and World Bank as well as the New Zealand Ministry for the Environment.
DISCOUNTING HEALTH EFFECTS & CONFLICTS OF INTEREST

Despite the growing volume of empirical evidence over the years that the spray Foray 48B is not safe for all, most of the adverse health effects reported in New Zealand have been systematically discounted by public health and the government contracted health provider. As noted previously the experienced health impacts were instead re-labelled and attributed to psychosomatic responses – with the implication inherent in this label that any ill health effects are the fault of the person, not the external environmental factors.

How this could have happened in the face of documented and validated health effects appears to be complex, but the incident at the Hamilton high school in 2003 reveals a sequence of events that sheds some light on the process.

As the OSH investigation shows, the examining medical personnel from the AGM Health Service failed to elicit information from staff presenting with spray-related symptoms that they were working in the spray zone. If staff had not been exposed to the spray, then in the ‘opinion’ of the doctors the concerns and reactions staff were reporting had nothing to do with the spray. Their subsequent treatment would appear to confirm this view and was indeed the catalyst for the complaint by the high school Principal to OSH. As the OSH investigator reports:

[The Principal’s] concern was that the diagnosis had often failed to acknowledge any link between the spray and the serious health complaints that staff were suffering from. It was perceived that medical consultations had trivialised or dismissed any notion that the spray was the culprit in situations where staff had presented with serious allergic reactions including skin sensitivities and respiratory problems. Specific information as to the extent of suffering indicated that some staff were very severely debilitated to the extent that they suffered extensive swelling and nausea in addition to skin and respiratory complaints. 35

This incident appears to confirm that the psychosomatic diagnosis has arisen from the belief that firstly the spray was toxicologically safe, and secondly that the ‘patient’ had not been exposed to the spray. Similar ‘opinions’, and concerns about the way people were treated, were reported by the Commissioners examining the PAM spraying programme. They considered that the persistent belief that Foray 48B was safe had an affect on the attitude of the Health Service personnel.

This would go some way to explain the treatment reported to us by people who presented to the health service with symptoms. If the spray is safe, then the symptoms must be caused by something else. If the symptoms are caused by something else, then the presenting resident is trying to access “benefits” they are not entitled to. 36

The Commissioners record in some detail the treatment experienced by the affected community during the PAM programme. They note that many of the reports indicated that the medical personnel from the PAM Health Service seemed determined to either “attribute symptoms to any cause but the spray”, or not to “consider the possibility that the spray may be aggravating pre-existing symptoms such as asthma”.

People with respiratory difficulties were told that the fact that they had asthma before the spraying began meant that their current difficulties could have nothing to do with the spray. Those giving

35 OSH Report 2003, 5.6 pp7
36 Report of the People’s Inquiry 1.5.1
testimony also described dismissal of symptoms without physical examinations, and some related experiences of ridicule and degrading treatment. 37

As noted previously the concern had been expressed by the Commissioners that the government contracted Health Service failed to provide assistance to many affected people because it was working to a 'pre-determined script' that did not describe their symptoms as being an effect of the spray. As that ‘script’ would have been based on the conclusions of previous HRAs and surveillance reports, the author of who was now the Director of both the PAM and AGM Health Service, questions about lack of independence or conflicts of interest were raised.

The agencies involved in looking after the public’s health in connection to the PAM programme were seen by some as compromised for those roles by their other activities. The Director of Aeraqua was also employed as MAF’s independent medical advisor and had earlier advised MoH and the Ministry of Forestry that Foray48B spray was safe to use in connection with the white spotted tussock moth programme. 38 Auckland Public Health Services, whose role includes investigating health hazards and health complaints for the people of Auckland, had also carried out the 2002 Health Risk Assessment much cited by MAF. Many in the community felt that these involvements in vetting Foray48B would make those agencies reluctant to recognise unforeseen health impacts of the spray—in other words, that they represented a conflict of interest. This is not an unreasonable concern. 39

Both the Commissioners and the Ombudsman raise additional and more serious concerns about conflicts of interest involving the Government and its Ministries. Apart from the primary concerns about MAF’s involvement in contracting and paying for all health services and risk assessments as well as research and monitoring for the programmes, the Commissioners go further and question whether it should even manage the health impacts of its own incursion response.

In our view it is inappropriate that an agency (MAF) primarily committed to the protection of primary production and trade should have responsibility for managing the human-health impacts of an incursion response. In our view, it is doubtful that any community expected to bear the health risks of an incursion response will have confidence in MAF to properly consider health impacts when primary-production sector interests are at stake. 40

The Ombudsman raises similar concerns about the need to ensure that human health issues that arise from a biosecurity campaign should be dealt with by an agency that is “demonstrably separate” from that engaged in the eradication process.

While I am well aware of the value in some circumstances of a “whole of government” approach and indeed have advocated it, I believe it is important, if public confidence is to be restored in operations of this nature, that the Ministry of Health should be charged (and be seen to be charged) with the responsibility of ensuring that the health concerns of the population liable to be sprayed

37 Ibid 1.1
38 Jenner Consultants Ltd., Health risk assessment of Btk spraying in Auckland's Eastern Suburbs to eradicate White-Spotted Tussock Moth (Orgyia thyellina), Report to the Ministry of Health and the Ministry of Forestry commissioned by the Northern Regional Health Authority, 4th September 1996; Jenner Consultants Ltd., Clarification of issues raised in “Our Case Against Moth Spraying”. Report to the Ministry of Forestry, January 1998; Aeraqua® Medicine Ltd (formerly Jenner Consultants Ltd). Health Surveillance following Operation Ever Green: A programme to eradicate the white-spotted tussock moth from eastern suburbs of Auckland. May 2001. [footnote in original]
39 Report of the People’s Inquiry 1.5.3
40 Ibid 1.5.2.
receive at least equal consideration with ecological or biosecurity issues. I am not convinced that was so in the West Auckland and Hamilton operations. 41

Evidence that this ‘whole of government’ approach led to an abdication of responsibility for human health protection in favour of biosecurity interests was clearly accepted by the Ombudsman, and he details his disagreement with the various interpretations and defenses that he received from the MoH about how they saw their role, responsibilities and statutory functions.

In short, it was found that at government level there was a conflict of interest between the need to eradicate the pest as efficiently and quickly as possible and the responsibility to ameliorate or manage the side effects of that response on the people being sprayed. The investigations show quite clearly that when MAF was responsible for both aspects of the programme, its primary function and responsibility to eradicate the pest took precedence and health was insufficiently considered and protected.

The Ombudsman makes it clear that this needed to change, and recommends that in any future operations the Ministry of Health should appoint a senior official “whose task it will be to look critically at all relevant human health implications, and to be prepared to express an independent viewpoint where there appears to be conflict between the spray operation itself and the human health implications for people living or operating in the relevant area”. 42

The Commissioners were concerned enough to make a similar recommendation, and in their opinion “all health-related aspects of biosecurity, including the health impacts of future incursion responses and research on those impacts, should be the responsibility of the Ministry of Health. They should neither be funded by nor delegated to MAF or Biosecurity New Zealand.” (Recommendation 11)

PRECAUTION NOT POST-MORTEM

The abdication of responsibility for human health protection that is detailed above almost certainly accounts for the lack of not only any prospective control or cohort studies, but any Government funded long term studies arising from the three NZ aerial spraying programmes. As noted earlier by the Commissioners, it was the Ministry’s view that as they were informed the spray was safe, there was no justification to spend government funds on any health studies.

There has been some acceptance of acute health effects from Foray 48B and the well documented incident at the Hamilton high school is one example. However, the toxicological approach, that believes the amount of spray people are exposed to is not sufficient to cause any adverse effects on health, let alone chronic or long term effects.

41 Report of the Ombudsman 40 pp 12
42 Ibid 38
still holds sway. The fact that there are no long term follow up studies to determine if
this hypothesis is valid should be borne in mind. 43

This 'catch 22' situation results in a degree of uncertainty that is difficult to resolve. But
looked at from a positive viewpoint this presents an opportunity. Where uncertainty exists
and cause and effect relationships are not clear, or contradictory, a precautionary approach
can be applied. This is vital when the potential for harm is from a programme like urban
aerial spraying, which no-one can avoid. This approach would also overcome the
apparent hurdle of scientific certainty that the Ombudsman expressed concern about in his
deliberations.

I also have concerns about the level of proof which is sought in relation to the spray
programmes being causative of the various ailments which seem now to be acknowledged as
occurring during such operations. While I accept that science, including medical science,
involves a seeking after certainty, it appears to me that a notion such as the distinction between
proof beyond reasonable doubt, and proof on the balance of probability, has a proper place
where, for whatever reason, scientific certainty cannot be achieved yet significant human health
issues may be at stake. 44

Cause and effect would appear to have been accepted by the authors of all the studies and
reports detailed here, if their notes of caution and recommendations for further research are
acknowledged. In the absence of any recommended long term studies being undertaken,
and given the unreliability of the human health data collected during these New Zealand
programmes, it would seem imperative that a precautionary approach is taken by any
community that might still be subjected to this spray. This is particularly relevant for
Hamilton, Ontario where authorities are actively proposing to continue using aerially
sprayed Foray 48B in an urban environment.

Whilst aerial spraying was considered the only option for achieving eradication of an
invasive moth in New Zealand, Hamilton does have alternative ground control tools.
Harnessing the co-operation of the community to support alternative programmes, it should
be possible to achieve a safer way of controlling the Gypsy moth.

The New Zealand Parliamentary Ombudsman and the Commissioners for the People’s
Inquiry detail a wealth of up to date and relevant information in their Reports which can
support and advise communities in finding an approach that leads to a safer alternative to
aerially spraying pesticide. When the health implications are significant and there is no
proof that the effects did not occur as a result of the spray, it would be unethical not to do
so. Precaution is far better than post-mortem.

Hana Blackmore
October 2008

43 Community reports are recording chronic effects, but without funding for appropriate research these
remain anecdotal. (See reference 28 for example of published report that records severe chronic effects in 2
affected staff members from the Hamilton high school.)
44 Report of the Ombudsman 16.31
REFERENCE


