

*Office of the*  *Ombudsmen*  
*Te Tari -o- Ngā Kaitiaki Mana Tangata*

**REPORT OF THE OPINION OF OMBUDSMAN MEL SMITH**

**ON COMPLAINTS ARISING FROM AERIAL SPRAYING**  
**OF THE BIOLOGICAL INSECTICIDE FORAY 48B**

**ON THE POPULATION OF PARTS OF AUCKLAND AND HAMILTON**

**TO DESTROY INCURSIONS OF PAINTED APPLE MOTHS,**  
**AND ASIAN GYPSY MOTHS, RESPECTIVELY**

**DURING 2002 - 2004**

OFFICE OF THE OMBUDSMEN  
WELLINGTON

December 2007

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**TIME LINE**

| <b>DATES</b>                           | <b>EVENTS</b>   | <b>REFERENCES</b>                  |
|--|---|------------------------------------|
| <b>1996/97</b>                         |   |                                    |
| July 96 to February 97                 | Tussock Moth Scientific Panel   | Para.3.11 et seq. Doc 3B           |
| October 96 to April 97                 | Operation Ever Green -Eastern Auckland -30,000 households - 86,000 people -158,000 L of Foray 48B – up to 4000 ha.  | Parts 3, 4, 5, 13                  |
| October to December 96                 | 9 sprays - DC6  | Para.13.1                          |
| October 96 to April 97                 | 23 sprays by helicopter   | Ditto                              |
|  |   |                                    |
| <b>1997</b>                            |   |                                    |
| April                                  | Sinclair Review Committee Report to Cabinet<br><br>Proposed spray programme did not proceed   | Para.3.16 Doc 4AB<br><br>Para.4.11 |
|  |   |                                    |
| <b>1998</b>                            |   |                                    |
| 1.3.98                                 | Separate Ministry of Forestry abolished and a new Ministry of Agriculture and Forestry created  |                                    |
|  |   |                                    |
| <b>1999</b>                            |   |                                    |
| 5 May 99 to October 01                 | PAM discovered at Glendene, and spreads to other western suburbs and to Mount Wellington  | Para 6.1, Doc 13A                  |
|  |   |                                    |
| <b>2002</b>                            |   |                                    |
| January to June, and then to September | Aerial spraying of 500 to 600 ha extending to 900 ha - helicopter and Air Tractor.<br>Interim containment just prior to General Election.                     | Part 9                             |
| June to early July                     | MAF wary of mass spraying   | Para.9.4                           |
| July                                   | General election  |                                    |
| August                                 | MAF supports mass spraying  | Para.9.6                           |
| 23 October 2002 to May 2003            | Mass spraying carried out - 8000 and 12,000 ha - maximum of 43,000 homes and 133,000 160,000 people – 193,000 – Fokker Friendship, Air Tractor and Helicopter | Parts 10 and 11                    |
| November                               | 1st Survey by Venture Research  | Doc 28 Para.13.6                   |
|  |   |                                    |
| <b>2003</b>                            |   |                                    |
| January                                | Dr Watts's Health Impact Report   | Doc 38, para 13.30                 |
| February                               | Survey by NZEI, West Auckland   | Doc.44, para 13.18                 |
| March                                  | Wellington School of Medicine report commissioned   | Part 15 Docs 46A and 52            |
|  | Lone Asian Gypsy Moth discovered in Hamilton  | Part 12 Docs 71 and 105B           |
| 4 April                                | 2nd Venture Research survey.  | Para 13.6 Doc 50/50A               |
| 28 April                               | Complaint from Jane Schaverien against MAF MoH and WCC.   |                                    |
| 28 May                                 | HAG - first meeting   | Para 14.24 – 14 34 Doc 57          |
| 4 July                                 | HAG - 2nd meeting   | Doc 65                             |
| 29 July                                | 3rd Venture Research survey   | Para 13.6                          |
| 14 August                              | HAG – 3 <sup>rd</sup> meeting   | Doc 65                             |
| 29 September                           | Complaint from Ms M. Rhodes against MAF and MoH in relation to spraying at Hamilton.  |                                    |
| October to November (8.10 - 29.11.03)  | Aerial spraying carried out over parts of Hamilton-1253 ha - 30,600 people - 8 flights - 65,300 L (ave. 8 L/ha)   | Part 12 Doc 84/105B, Doc 87A       |

|             |   |                           |
|-------------|---|---------------------------|
| October     | OSH report on Fraser High School,<br>Hamilton     | Doc 93                    |
| 24 October  | HAG 4 <sup>th</sup> Meeting                       | Para 14.25 – 14.34 Doc 65 |
| 1 December  | 4 <sup>th</sup> Venture Research survey           | Para 13.6 Doc 94A         |
| <b>2004</b> |   |                           |
| February    | Wellington School of Medicine<br>report completed | Part 15 Doc 96            |
| 2 February  | HAG 5 <sup>th</sup> (final) Meeting               | Para 14.29 Doc 65         |
| April       | 5 <sup>th</sup> Venture Review survey             | Para 13.6 Doc 99A         |
| 13 May      | Auckland aerial spraying completed                |                           |
| <b>2006</b> |   |                           |
| Feb         | Di Marco report to Waitakere C C                  | Para.2.2                  |

## **CONCLUSIONS AND RECOMMENDATIONS**

### **Introduction**

1. This is the Report of my opinion upon the complaints mentioned below. It should be read with Appendices 1 and 2 below which form part of this Report.<sup>1</sup>
2. Following the circulation of a second draft report I met, at their request, with the Chief Executives of the Ministry of Agriculture and Forestry and the Ministry of Health, and I received further submissions from them which I have taken into consideration. I also received and responded to a request from the Hon Jim Anderton, Minister for Biosecurity, to consult with him pursuant to section 18 (4) of the Ombudsmen Act.
3. In June 2003 I received complaints from Ms Jane Schaverien, then of Auckland but now of Wellington, to investigate under the Ombudsmen Act 1975 the question whether the information given to Ministers by the Ministry of Agriculture and Forestry was inadequate regarding the possible dangers associated with the widespread concentrated use of Foray 48B in West Auckland, and in relation to the Ministry of Health, whether the Ministry had failed to pursue its responsibilities under the Health Act, 1956, or had abdicated those responsibilities in favour of the Ministry of Agriculture and Forestry.
4. In September 2003 I received a complaint from a Hamilton resident, Ms Michelle Rhodes, in generally similar terms regarding the Ministry of Agriculture and Forestry.
5. These complaints arose from the aerial spraying operations carried out on behalf of the Ministry of Agriculture and Forestry in West Auckland to eliminate the Painted Apple Moth, and in parts of Hamilton to eliminate the Asian Gypsy Moth. In relation to West Auckland these operations began on a comparatively small-scale in January 2002, they were continued on a much larger scale through to May 2003, and were finally completed in May 2004.
6. In relation to Hamilton, the operation was of much shorter duration, namely the months of October and November 2003, but more concentrated.
7. There has, unfortunately, been some considerable delay in the disposal of these matters but I have received full submissions from both Ministries in reply to my Draft Report issued on 7 May 2007, and to the Final Draft, issued on 19 September 2007. These, together with information provided by the complainants and from other sources (all recorded in Appendix 1) have enabled me to reach the final conclusions and recommendations discussed and set out below.
8. The question of the scope of my investigation, and the causes of delay are discussed in Appendix 1.<sup>2</sup>

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<sup>1</sup> Appendix 1 is the final version of the draft reports circulated to interested parties in May and September 2007 for comment.

<sup>2</sup> Parts 1 and 2.

9. After my report was substantially complete I became aware of a report from an Auckland-based group called the People's Inquiry. At a much earlier stage I had received unsolicited information from that group. I did not consider it appropriate for me to take that material, or the more recent report, into account in my consideration of these complaints and I have not done so.

### **Operation Ever Green**

10. In the early part of Appendix 1 I have referred to the earlier operations carried out during October 1996 to April 1997 (known as *Operation Ever Green*) over part of eastern Auckland directed to the elimination of the White-spotted Tussock Moth. I regarded it as necessary to do that not in order to report on the conduct of that operation but because there was a considerable overlap with the operations carried out in 2002-2004. The commonalities were the involvement of the same Ministries<sup>3</sup>, the use of the spray known as Foray 48B, the healthcare structure established by MAF, and the availability of a substantial amount of information gathered during the operations of 1996/1997.

### **Spray operations**

11. In East Auckland the population resident within the sprayed area was estimated to be 86,000 people. The West Auckland operations were directed originally to an area of approximately 500 ha., but that was subsequently extended to 12,000 ha. involving up to an estimated 193,000 people. In Hamilton the number of people involved was estimated to be over 24,000. As I understand it, those figures take no account of people who had to enter the spray area, or pass through it, in the course of their daily activities. The then Minister of Biosecurity described the West Auckland operation as being on a scale "unprecedented worldwide".<sup>4</sup>
12. So far as the actual spray operations themselves are concerned, I have no reason to doubt that they were carried out in a professional manner and that they achieved the objective for which the Government allocated over \$85m in the fiscal years 2003 – 2005.<sup>5</sup>
13. Nothing in this report is to be taken as questioning the decisions of the Cabinets of the time to authorise the spray operations over parts of West Auckland and Hamilton. Such decisions were matters for Cabinet and are not within the powers of an Ombudsman to question or investigate.<sup>6</sup>

### **Impact of West Auckland and Hamilton operations**

14. In this investigation my concern has been with the impact, and possible potential impact, that the use of the spray Foray 48B by aerial spraying may have had upon the over 217,000 people within the West Auckland and Hamilton spray zones.

<sup>3</sup> The Ministry of Agriculture and the Ministry of Forestry were amalgamated on 1 March 1998.

<sup>4</sup> [Doc 21] Minister's submission – CBC(02)101 para.76

<sup>5</sup> [Doc 18A] CBC Min (02)7/1

<sup>6</sup> Cf. Ombudsmen Act 1975 s.13(1) and (2).

15. I have reached the conclusions that insufficient attention was paid to the impact of these operations, and that since there is the likelihood that the need to carry out similar operations may well arise in the future, it is important that a structure be established that will enable the worst features of these earlier operations to be avoided.
16. In particular, there needs to be a clear official acceptance that although the numbers of people may not be great as a proportion of the community in the spray zone, there will, in raw numbers, be a significant number who the evidence indicates will require medical attention, and in some cases removal from the area to be sprayed. It is no light thing to be sprayed, perhaps repeatedly, with some substance the ingredients of which are to some extent confidential, and to have one's life substantially disrupted for what may be a quite lengthy period of time.
17. I am of the view that if a New Zealand government is going to authorise a major spray programme such as those in issue here it is essential that it has, and retains, public support. That point was emphasised in one of the last of the reports available to me in relation to Operation Ever Green.<sup>7</sup> However, in respect of both the West Auckland and Hamilton sprays it was apparent that while the majority put up with the discomfort and inconvenience, there was a significant lack of public support, and mistrust of the Government agencies involved.
18. I have considered a large amount of information in the course of this investigation (as will be seen from Appendix 1) but there are two items to which I wish particularly to refer. They are the Venture Research Ltd document entitled *"Painted Apple Moth Resident Perceptions - Research Report (February 2004)"*,<sup>8</sup> and a report by the same agency entitled *"Painted Apple Moth Campaign Communications – Research Report"*.<sup>9</sup> The copy of the latter report that I have is undated but was prepared after completion of the PAM operations. They were of course prepared for MAF.
19. The methodology of the first report can be summarised as;
- "We conducted in-depth telephone interviews with 20 "average" residents in the five summer areas - 4 residents from each area...
- The interviews were carried out in the week commencing 2 February 2004...
- These residents were recruited and screened to ensure they are not part of any pressure groups focused on the eradication campaign. This was done to ensure the views identified by research were representative of the vast majority of residents - not the "fringe" pressure groups."
20. Later in the report the interviewers state the actual comments of some of those interviewed as:
- "I don't want to even think we've gone through all this grief for nothing."*
- "We've made such a big sacrifice over the last few years, we should finish the job properly and make sure moth never gets a foothold in New Zealand again."*

<sup>7</sup> [Doc 3AA] Minister's submission – CIE(97)119 para.8

<sup>8</sup> [Doc 102DD]

<sup>9</sup> [Doc 102DD/1]



21. Later still, the interviewers summarise the views expressed by 25% of those interviewed:

"When the spray programme started some interviewees were quite concerned about the effects of the spray on themselves and their family. These concerns were fuelled by rumours that the spray containing toxic chemicals and by protest group assertions that were covered in the media.

"Over time, these health concerns have reduced ...:

"However, there is one last concern held by some interviewees (5 out of 20). They worry the spray may have small (but significant) long-term impacts on residents health - because of the large number of times Auckland people have been exposed to the spray.

"These people worry about the length of time the spray has been used in Auckland (especially over the heavily infested areas). They say this is a type of exposure not been experienced before - and is therefore not covered by the health studies MAF has seen.

"They wonder if the spray is still safe in the circumstances - and if the public may experience health problems in 10 to 20 years because of this high-frequency contact.

"They say these long-term health effects tend to be invisible at the time of the exposure to the chemicals - but then manifest in diseases like cancer, blood disorders, and breathing problems later in life.

"These people would like to hear about any studies which indicate these long-term health problems will not occur due to the high-frequency spraying they have experienced in Auckland."

22. Whether the views of a sample of 20 persons are statistically acceptable may be open to debate, but I note that these presumably experienced researchers considered them acceptable as the basis of advice to MAF, and did so deliberately so that they would be "representative of the vast majority of residents - not the "fringe" pressure groups".
23. The second report was differently directed. I have not expressly referred to it in the Draft Reports, though it was amongst the material considered.
24. MAF pre-selected a group of people and organisations to be consulted regarding MAF's communications during the three years of aerial operations. They included health, local authority, business, school and journalist representatives. In-depth face-to-face interviews took place with each individual stakeholder.
25. In relation to health issues, it is recorded that many stakeholders said MAF made a big error early on in the spray programme by giving the impression that the spray had no health effects. This resulted in a big credibility gap for MAF with the public and stakeholders who saw or heard that the spray was indeed causing health problems in the community. Seeing these reactions and hearing MAF's denials about it made the public think MAF was not disclosing harmful elements of the spray. While some of these matters were corrected at later stages and well after the public had experienced allergic reactions,

"many people had become unnecessarily suspicious about the health risks posed by the spray and did not believe MAF's assertions to the contrary when the information was provided. MAF's apparent denial regarding the health effects of the spray gave protest groups unnecessary credibility with the public because these groups had maintained all along that the spray was not safe."

26. Part of this was due to MAF's public statement early in the campaign that they could not disclose the contents of the spray. The public was therefore left to speculate about the active ingredients in the spray which resulted in a lot of suspicion and some hysteria about the use of "toxic chemicals" in aerial spraying over populated areas. Reference was also made to the lack of information to schools, play centres, and other childcare facilities.
27. The report commented on the value of a representative Community Advisory Group for future operations. It recommended a wider representation than appears to have occurred, and emphasised that MAF must listen to and act on feedback provided by the Group. While there were occasions when the Group's views had been acted upon, MAF's failure to listen on other occasions operated to the detriment of MAF in its fight for public support.
28. To this may be added some brief extracts from the document *"A Study of Presentations of Householder Concerns to the Painted Apple Moth Health Service and Auckland Summer Symptom Survey"* (June 2005),<sup>10</sup> part of which is set out fully in Appendix 1. Under the heading "Patterns of Presentation to the PAM Health Service" it is said:
- "The complexity of concerns voiced by householders contacting the health service, reflected the spectrum of frustration and anxiety of the general population in perceiving harm and loss of control by a change of environment. This was evident in the subsequent enquiries by householders following every major media release and in reaction to information released by a well organised protest lobby....
- "The proportion of householders contacting the health service displaying irritability, frustration, anger and anxiety, outweighed those who suffered pre-existing mental illness...
- "Whilst the spray programme caused disruption to the daily life of those relocating, whether on their own accord or with the support of the PAM health service, the effects of relocation varied according to situational and individual differences in adapting to such disruption."
29. While of course there were those in the community who were implacably opposed to the spray programme, I have emphasised this material because it tends to show that aside from the limited number in the implacably opposed camp there was a wide range of concern on issues of importance to the community which was not being met.
30. I consider that it was unfortunate that these information gaps were allowed to arise and persist. It is important that that should not happen in the future.

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<sup>10</sup> [Doc 120]

31. I shall deal below with the role of the Ministry of Health.

### **Recommendation 1**

- a) My recommendation is that the spraying agency must provide full and accurate information in relation to the need for the spray programme and about the contents of the spray. It should also unequivocally acknowledge that there may be harm caused to some people residing or present within the spray zone.
- b) That publication should be made as early as possible to enable those who may wish to do so, to seek medical advice and to take steps to limit, or avoid, exposure to the spray.
- c) There would need to be a well planned communications strategy which should encompass details on demographic groups, food allergies, respiratory problems, family disruptions, and the opportunities for access to medical general practitioners and specialists. Basically, there should be a health service that is sensitive to the community it serves, and is proactive.
- d) Part of that strategy could involve the establishment of a community liaison group with a wide range of relevant experience and interests.

### **Public participation**

- 32. Also, I consider that there needs to be consideration given to the desirability of the seemingly automatic use of section 7A of the Biosecurity Act, which has the effect of overriding protections which might otherwise exist under Part 3 of the Resource Management Act. I appreciate that the processes of that Act can be time consuming, but it should be possible to devise a procedure which provides a sufficient opportunity for the Environment Court to furnish an independent judgement.
- 33. Environmental Impact Assessments relating to West Auckland and to Hamilton were prepared but they each became available only after the spray programmes had been put in place and were operational. The timely availability of such information should be a priority, and form part of any legislation authorising reference to the Environment Court.

### **Recommendation 2**

I therefore recommend that amendments to the relevant legislation be considered and enacted as a matter of urgency so that they are immediately available should the need arise.

### **Role of the Ministry of Health**

- 34. The Ministry has addressed me at some length on this issue, and the connected issue of the importance of a “whole of government” approach coupled with the Memorandum of Understanding between the Ministry and various other agencies, notably MAF. I have given full and careful consideration to those submissions.
- 35. I think that the difference between my perception of the Ministry's role in this instance and the Ministry's own perception is largely one of degree. The

Ministry tended to approach the matter from the standpoint of whether there was what I will describe as a macro public health issue, epitomised by the oft repeated phrase "no adverse health patterns were found, once patterns were examined at a population level". In terms of actual effect the issue was rather a micro public health issue affecting a comparatively small number of people, but nevertheless, on the evidence, having a significant impact on their health.

36. In the Ministry's most recent memorandum - **Part 3 - The MOH's Concern About Individual Health Effects** - it is stated that it was important that it be made clear to individuals in the spray zone that there was no evidence of serious long-term health effects resulting from the spray. However, the absence of such evidence was due to two factors, namely that the events had just recently occurred, and secondly, that no research into long-term effects had been conducted. It is unclear to me whether that second situation remains. If it does, I consider that it is a matter which should receive the Ministry's urgent attention.
37. I do not accept that the definition of "public health" is necessarily to be applied on what the Ministry described as a population basis. The words "or section of such people" in my opinion are capable of applying without difficulty to a contiguous area containing some 193,000 people, a number which substantially exceeds the population of the Hawke's Bay Region, for example. I have not suggested that the Ministry used such measure to hide facts, but rather that it was addressing the wrong issue.
38. It is accordingly my opinion that when future aerial spray programmes are to be carried out over heavily populated areas it is very desirable that the Ministry should appoint a senior official within its head office structure 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. In saying that it is not my intention to denigrate the office of Medical Officer of Health. No doubt the senior official would act closely with the relevant Medical Officer of Health, but such official has the advantage of being closer to the centre of government.
39. I have commented about the need to ensure that, in cases such as this where Cabinet must consider not only issues of national significance but also significant public health issues, that appropriate independent advice is critical in the decision-making process. It was not clear to me, based on the available information, that this happened in the spray projects I have examined.
40. 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 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. I accept that memoranda of understanding can be useful tools in achieving whole of government outcomes, but in the situations in issue here they may create a perception of conflict of interest. The main focus of the operation was to kill off the relevant pest. That was MAF's function. However, there were human health issues that arose from that process. I consider that public confidence will be put at risk if these issues are not addressed by an agency which is demonstrably separate from that directly engaged in the eradication process.

### **Recommendation 3**

- a) It is accordingly my recommendation that in the circumstances outlined in paragraphs 35 to 37 such a senior official be appointed with the duties indicated. This is desirable for the well-being of the public within the sprayed area and for the maintenance of public confidence.
- b) In the meanwhile, it is desirable that further research at an appropriate level be conducted into the relationship to human health of the frequency, duration and intensity of spray operations.

### **Increase of the spray zone**

42. With reference to Part 4 of the Ministry's memorandum, which deals with the increase in the spray zone, I of course accept that the spray operations in West Auckland and in Hamilton were the subject of Cabinet approval. The Ministry cites a statement from an earlier document, "while the increase in the exposed population would increase the numbers of people reporting discomfort or health effects (absolute risk), it would not change the expected impacts on a proportional basis." As a statistical assumption I accept that statement, but I am not primarily concerned with statistical analysis in this instance, but rather with the actual numbers of people affected or likely to be affected. In paragraph 16.9 of Appendix 1 I have set out the communications which passed on 7 August 2002. Although it has been said that this was the culmination of earlier communications, nothing more has been provided to me.
43. I therefore do not accept that adequate attention was given to the likely impact on individuals of the very substantial increase in spraying that occurred in West Auckland, or for that matter, in Hamilton.

### **Ingredients of Foray 48B**

44. With reference to the ingredients of Foray 48B, upon the information available to me, it appears that the issue is not so much in relation to the substance *Btk* but the problems which seemed to flow from allergic reactions to the so-called inert ingredients. As I have indicated in paragraph 16.17 of Appendix 1, it is desirable that all issues arising from the formulation of Foray 48B should be resolved, and it may be that it would involve the services of an allergist.

### **Recommendation 4**

It is my recommendation that the steps necessary to resolve outstanding questions regarding the formulation of Foray 48B be taken forthwith.

## **Wellington School of Medicine**

45. In Appendix 1 I have dealt at some length with the question of the report prepared by the Wellington School of Medicine. I have noted what is now said in the Ministry's latest memorandum. I have asked on a number of occasions for the memoranda which one would have expected to support the decision to engage the Medical School. I am told that such material does not exist.
46. 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.
47. I remain somewhat surprised at the Ministry's continual attempts to sidestep the Watts and Blackmore reports and the diary of Ms Lewis. The reports were reviewed by experts and, within their scope, were regarded as acceptable. Ms Lewis's diary was a contemporaneously prepared study of events as she saw them. That should not be taken to mean that I necessarily accept all that she says in its entirety, as at times it is evident that she was under considerable stress, but the diary does provide a record of what was actually occurring on the ground.

## **Ms Schaverien's queries**

48. In her response to my second Draft Report, Ms Schaverien asked for my views on some matters related to the investigation. These included:

Did I consider that it was unreasonable, unjust, oppressive and improperly discriminatory, given present knowledge, to spray a human population from the air with Foray 48B without their informed consent?

49. My answer is that as my report shows, there were aspects of the spray operations which I consider to have been less than wholly satisfactory. I would not, however, use the labels suggested by Ms. Schaverien. If by informed consent she means individual consent; that would be impractical.

She asks whether it would be possible for me to offer an evaluation of the government choosing to enter into a confidentiality agreement with a chemical manufacturer since this prevents those affected by the spray from knowing the ingredients and being able to track the cause of their ailments. They cannot avoid the ingredients to which they may have been sensitised and which occur in many common products. A recommendation about the wisdom of making such confidential trade agreements in the future would be valuable.

50. In principle, I consider it preferable that such arrangements should not operate so as to preclude important health information being available to those who may need it. How that is achieved is a matter for the purchasing agency in concert with the appropriate regulatory authorities, and perhaps the Ministry of Health.

51. I have recommended that the fullest information about the spray and its possible effects should be made available. The point that Ms Schaverien raises might form part of that approach.

Dated            December 2007

Mel Smith  
Ombudsman

## APPENDIX 1 - INVESTIGATION

### 1. Complaints

- 1.1 In June 2003 I received a complaint from Ms Jane Schaverien to investigate under the Ombudsmen Act, 1975, whether the information (including the health risk analysis) given to Ministers by the Ministry of Agriculture and Forestry was inadequate regarding the possible dangers associated with the widespread and concentrated use of Foray 48B, and, if that proved to be so, to investigate why that situation arose.
- 1.2 At the same time, I also received a complaint from Ms Schaverien in relation to the Ministry of Health, which could be summarised as being that the Ministry had not pursued its responsibilities under the Health Act and/or other relevant legislation, or had abdicated those responsibilities in favour of the Ministry of Agriculture and Forestry.
- 1.3 Both complaints had to be read in the light of the complainant's assertion that it is *"unreasonable, unjust, oppressive, and improperly discriminatory to spray a human population from the air with Foray 48 B and without the people's consent"*.
- 1.4 At that time also, generally similar complaints were made in relation to the Waitakere City Council, but after investigation I formed the view that the Council was not at fault. However, I have more to say on that issue below.<sup>1</sup>
- 1.5 In September 2003 I received a further complaint, from a Hamilton resident, Ms Michelle Rhodes, in generally similar terms against the Ministry of Agriculture and Forestry but with the added concerns, in her case, that she was a grower of organic foods and feared that her chances of obtaining certification would be prejudiced by reason of the Foray 48B spray<sup>2</sup>. Also, for health reasons, she would be obliged to remove from Hamilton to the home of a relative at Taumarunui in order to avoid being affected by the spray.
- 1.6 An Ombudsman's powers of investigation of a complaint are widely conferred and are not necessarily constrained by the actual terms of the complaint.<sup>3</sup>
- 1.7 Although, when I sent my first provisional view to the Ministries on 11 September 2003, based on the limited material then available to me, the matter appeared capable of a reasonably early resolution, it subsequently became evident that that was not to be so. The Director-General of Agriculture replied to that provisional report on 30 September 2003,<sup>4</sup> and in conclusion expressed the hope that with the additional information and explanations that he had provided I would acknowledge that Ministers had been adequately advised. The response of the Director General of Health is dealt with in Part 16 below.

<sup>1</sup> See paragraph 13.12 and the following.

<sup>2</sup> According to *Health Risk Assessment* - 4.9.1996, para. 3.1, the use of *Btk* is permitted within the Certified Organic Production Standards published by Bio-Gro NZ for use on organically grown produce, but with certain safeguards. – [Doc 4A].

<sup>3</sup> Ombudsmen Act 1975 s.13(1) - (3).

<sup>4</sup> [Doc 71B]



- 1.8 In the course of my investigation my staff have considered over 190 items (many of them but recently provided) ranging from brief e-mail communications to very lengthy and weighty memoranda and reports, in addition to the submissions made by the Ministries in answer to my Draft Report of 3 May 2007 and my Draft Final Report of 19 September 2007. As a consequence, it has become necessary for me to look more widely at issues of process, of public communication, and of loss of public confidence arising from the administration of the spray programmes.
- 1.9 At the same time I have had in mind the forecasts of the economic consequences of a widespread moth infestation stated in the various departmental briefings to Cabinet.
- 1.10 As the decisions to authorise the two spray programmes were those of Cabinet, whose decisions an Ombudsman is not empowered to review, I must accept that there was seen to be a sufficient public interest in the spray programmes as such, but as I have indicated above matters of process etc have called for consideration.
- 1.11 My findings below will show that I have concluded that there were areas of shortcomings which need to be recognized as such, and that plans need to be put in place to avoid or remedy impacts on the health of the inhabitants of the areas to be sprayed. Within the concept of health I include emotional health as a factor arising from the intense spraying which took place both in West Auckland and Hamilton.

## 2. Delay

- 2.1 I have been concerned at the considerable time that has elapsed between the receipt of these complaints and the completion of this Report. Neither the complainants nor the Ministries should conclude that these matters have been taken lightly. As indicated above, considerable time has been spent on investigation and a very large quantity of information, much of it complex, has had to be brought together and absorbed. In addition it was necessary for me to seek independent information.
- 2.2 The main reason for the delay was, however, out of the control of my Office while negotiations took place with the manufacturers of Foray 48B, located in the United States. The company's agreement was sought to an assessment by an independent toxicologist of part of the ingredients of Foray 48B in order that the assessment could be provided to the Waitakere City Council in answer to the Council's complaint under the Official Information Act, 1982, regarding the withholding by the Ministry of Agriculture and Forestry of that information, which the manufacturers regarded as a trade secret.
- 2.3 That information had already been withheld on that ground from Ms Schaverien with the then Chief Ombudsman's approval. However, with the benefit of the much wider information available to me, I was of the view that the Council's responsibilities, including those for public health, made it desirable, if possible, for there to be what could be regarded as an independent consideration of the ingredients of Foray 48B - hence the negotiations referred to above. Unfortunately, the report added little to what was previously known.
- 2.4 The process of obtaining the assessment began in June 2003 and was completed with its receipt in February 2006. Since then, the further information mentioned above has been gathered from various sources and has been considered.

### 3. Events prior to complaints regarding Painted Apple Moth - Operation Ever Green – summary

- 3.1 Although the complaints in issue centre principally around events of 2002-2003, it is necessary to be aware of earlier circumstances, and for that purpose to revert to 1996 when an incursion of the White-spotted Tussock Moth (“WTM”) was detected in April 1996 in parts of Auckland. The then Ministry of Forestry decided that measures to contain or destroy the moths were necessary, and what became known as "Operation Ever Green" was launched.
- 3.2 The operation involved aerial spraying operations over that part of Auckland City bounded approximately on the north by Mission Bay, on the south by Mount Wellington, on the west by Remuera, and on the east by Glen Innes.<sup>1</sup>
- 3.3 The spraying on these occasions was carried out by a four-engined Douglas DC6 aircraft flying at between 150 and 200 feet (or approximately 50m.) above ground level which sprayed the area for three hours each morning on nine occasions between 5 October and 9 December 1996. Helicopters were also employed to undertake 23 spray rounds between 5 October 1996 and 17 April 1997, the first nine being conducted over uninhabited areas. Additionally, ground spraying took place during approximately the same period.<sup>2</sup>
- 3.4 It was later estimated that around 30,000 households (over 80,000 people) were exposed to the spray programme for a total of 130,000 lts. Of the 80,000 inhabitants, some 5,600 living in the sub-area of Mission Bay, Kohimarama West, and Meadowbank North, were exposed to helicopter spraying with a further 28,090 lts. of Foray 48B.<sup>3</sup> Approximately 16,000 inhabitants were below 15 years of age, and 11,000 were above 65 years. Other than as noted in 3.3 above, most of the area was residential in character, with numerous educational, and some medical, facilities scattered amongst it. The population was predominantly European, but with about 16% Maori and Pacific Islanders<sup>4</sup>.

#### - Introduction of Foray 48B

- 3.5 The then Ministry of Forestry agreed to purchase from Nufarm Ltd 64,600 litres of the biological insecticide marketed as “Foray 48B” for use as an aerial spray.
- 3.6 That substance may be described as a commercial formulation containing, as the active ingredient, the bacterial species *Bacillus thuringiensis* subspecies *kurstaki* (“Btk”) and a number of inert components. The inerts are so named because they are not considered to contribute directly to the pesticide activity of the formulation, but the term does not necessarily reflect their toxic potential.<sup>5</sup>

<sup>1</sup> Health Risk Assessment – Eastern Suburbs of Auckland (September 1997) p.3 [Doc 5]

<sup>2</sup> Ibid

<sup>3</sup> Health Survey following Operation Ever Green (2001) - summarised from the Executive Summary and paragraphs 1.1 and 1.2 [Doc 11]

<sup>4</sup> Health Risk Assessment – September 1996 pp. 8 – 13 [Docs 4 & 4A]

<sup>5</sup> .Health Risk Assessment - Eastern Suburbs of Auckland (September 1997) p.3. [Doc 5]

- 3.7 *Bacillus thuringiensis (Bt)* has been used as an insecticide for over (now) 30 years. In New Zealand, various formulations containing *Btk* have been registered for use as a ground spray on food crops including avocados, tomatoes and kiwi fruit, and approved for application up to the day of harvest.<sup>6</sup>
- 3.8 The use of the spray was authorised pursuant to the Pesticides Act, 1979<sup>7</sup>, by the Pesticides Board on 13 September 1996 under an "Experimental Use Permit (Limited Sale)" for 85,000 lts. That was subsequently extended to 110,000 lts on a similar basis. From information most recently available, the use was further extended to 200,000 lts with effect from 5 November 1996. So, in the space of just over two months this "Experiment Use" seemingly extended well beyond that originally envisaged. In fact, as para.3.4 shows, 158,090 lts were sprayed on areas of Eastern Auckland in "Operation Ever Green" during the period October 1996 to April 1997.
- 3.9 The permit was granted to test the efficacy of the Abbott formulation of Foray 48B against white spotted tussock moth to be applied at the rate of 3 - 5 lts/ha by 3 to 4 applications at 7 to 10 day intervals depending on any egg hatch numbers and monitoring. That the "experimental" permission should have been extended for what had clearly become a major commercial operation, under the control of MAF, is surprising.
- 3.10 Such permits were issued under section 25 of the Pesticides Act. "Experimental" was not specifically defined in the Act. I accept that the use was primarily directed against the target organism, but the substance was stated to be for use over an inhabited area, and section 29 of the Pesticides Act indicated that human health considerations were not excluded.<sup>8</sup>

#### - Tussock Moth Science Panel

- 3.11 It appears to have been recognised at an early stage that there would likely be some public concern at an operation of this kind.<sup>9</sup> The then Government, recognizing the importance of a broad range of independent scientific advice, established a group of scientists, known as the Tussock Moth Science Panel, to report directly to Ministers.<sup>10</sup> The issue was seen by Cabinet as being a political decision, and in September 1996 a group of six senior Ministers was deputed to decide whether the aerial spray operation should proceed.<sup>11</sup> A later Minute records the establishment of a Cabinet

<sup>6</sup> Ibid. p.31

<sup>7</sup> Repealed with effect from 2 July 2001, and replaced by the Agricultural Compounds and Veterinary Medicines Act, 1997, and the Hazardous Substances and New Organisms Act 1996

<sup>8</sup> I have referred below to the unsuccessful attempted use of s.10 of the New Zealand Bill of Rights Act 1990 in relation to the Hamilton spray programme- para.12.10.

<sup>9</sup> See, for example, App. 1 to the Minister of Forestry's paper attached to CIE(96)92 - 17.6.96 **[Doc 3AA]**

<sup>10</sup> The Panel first met on 12.7.96. Its membership of 8 was drawn from Landcare Research, AgResearch, Auckland University, and the then New Zealand Forest Research Institute. They included Prof Alistair Woodward, who was later part of the research team which produced the Wellington School of Medicine's Report (February 2004). He also peer reviewed the Health Risk Assessment (2002) for the Painted Apple Moth programme. The Panel was assisted by a large number of officials including representatives of the Ministry of Forestry and the Ministry of Health, who were in regular attendance at the Panel's meetings. CIE(96)111 para.19 **[Doc 3AA]**: Panel Minutes **[Doc 3B]**

<sup>11</sup> Minutes of the Panel – 12.9.96 para.8.– Cab.(96)M34/16.

Review Team, which reported to the Ministers of Forestry and Biosecurity.<sup>12</sup> It produced a report which went to Cabinet in April 1997, and was published.<sup>13</sup>

- 3.12 The Panel paid considerable attention to potential public health issues. At its first meeting the Panel was informed by the representative of the Ministry of Health that the Ministry accepted, based on the information available, that there appeared to be limited health effects from *Btk*. An analysis of the Minutes of the Panel shows that the Ministry of Health's position then was:
- i. It was more concerned with public perceptions, psycho-social effects and members of the public attributing illness to the spray than about direct health effects.
  - ii. But there was also concern that despite the overseas experience, unique factors in New Zealand, or in its population, might cause there to be some adverse effects from the spray.
  - iii. The Ministry was contemplating a cohort study in the event of aerial spraying which would need to be sufficiently sensitive to identify any related miscarriages and congenital defects.<sup>14</sup>
  - iv. It was regarded as important to establish the exact level of doses to which the residents of the spray zone would be exposed, and it could be of assistance to compare that dose level with that to which people were currently exposed as a result of private sprays and naturally occurring *Bt*.
  - v. The Ministry was anxious not to oversell the non-effects of *Btk* as there had only been two epidemiological studies done. Nevertheless, Cabinet was informed that, "details of the formulation have also been made available to the Ministry of Health, which is satisfied that Foray 48B contains no materials which, under the conditions of use, present an unacceptable public health risk."<sup>15</sup> (my emphasis) On 5 August 1996 Cabinet noted the Ministry's continuing concerns, "that there are outstanding health issues in respect of the proposed spraying to eradicate white spotted tussock moth... that these issues are still the subject of investigation"<sup>16</sup>
  - vi. The Ministry also emphasised the need to conduct a comprehensive health study, and the Panel noted that the repetitive aspect of the spraying operation was an important consideration. Cabinet was told, "the Ministries of Health and Forestry believe it is imperative that any potential health risks are identified, monitored and managed effectively..."<sup>17</sup>
  - vii. The Ministry informed the Panel that they had been unable to obtain Cabinet approval for additional funding, with the result that they were

<sup>12</sup> The Team comprised Mr Grant Sinclair (Chairman), Dr Basil Walker and Dr Ruth Frampton – CAB (96)M47/24 – [Doc 3AA].

<sup>13</sup> "Pest Incursion Management: A Review of the White Spotted Tussock Moth programme, with Recommendations for Future Biosecurity Practice." [Doc 4AB]

<sup>14</sup> Panel Minutes - 12.7.96 – paras.11 -15

<sup>15</sup> CIE (96)111 para.18 – 15.7.96 – [Doc 3AA]

<sup>16</sup> CAB (96)M29/17- [Doc 3AA]

<sup>17</sup> CAB (96)M27/12 – 22.7.96 – [Doc 3AA]

considering a smaller scale study of the health effects of the spraying. As they believed the spray to be safe, they were most worried about incorrect attribution of illnesses to *Btk*.

- viii. The Ministry produced a draft Cabinet paper "*Health Response to Operation Ever Green*"<sup>18</sup> The paper appears to have recommended a study of the toxicological properties of the inert ingredients of Foray 48B, and monitoring to detect any acute or chronic effects of the spray.
- ix. There was a need for a good regional health impact assessment and data which would fill in some of the gaps in the previous studies. It was noted that the asthma rate was much higher in New Zealand than in North America, and the health impact study would help to assess the significance of this. The need for a control group was noted as very important.
- x. There is a difference between extremely sensitive asthma sufferers, for whom almost anything could initiate an attack, and normal allergy sufferers who might be allergic to a specific ingredient of the spray. Medical information from people involved in the kiwifruit industry was to be sought since *Btk* was used by that industry.<sup>19</sup>

3.13 The wide-spread aerial spraying of a large urban population was recognised as a unique situation in New Zealand, and the Panel paid particular heed to the issues thus raised. From an analysis of the Panel's Minutes the following matters were regarded as relevant:

- i. There was a need to find out the exact components of the spray, and it was suggested that an assessment should be carried out by an allergist. There was also a suggestion that one role of the Panel might be to commission an independent analysis of *Btk*.<sup>20</sup>
- ii. The Panel was addressed by Dr John Reeve regarding the spray.<sup>21</sup> He stated that as it is a biological pesticide it was assessed according to special EPA guidelines rather than the traditional method used for chemical pesticides. Many studies had been done including food residues, skin irritation and lifetime studies. He said that it was capable of eye irritation but had not been shown to cause skin irritation. There was considerable data showing there to be no ill effects in people working with it or producing it, but there had been no hypersensitivity tests conducted. He believed *Btk* to be harmless.
- iii. Regarding allergic response as a result of inhaling the spray, he said that none of the data gathered from people to date had indicated that this was likely, but Foray had probably not been tested on people with a tendency to allergies. Dr Reeve noted that often in pesticides it was the added ingredients such as the surfactant, rather than the active substance, that caused problems.

<sup>18</sup> Not amongst material provided to the Ombudsman.

<sup>19</sup> These paragraphs are based upon Panel Minutes of 12.8.96 – paras.37, 43, 45, 46, 51 and 55

<sup>20</sup> Ibid – paras.26, 36 & 37.

<sup>21</sup> Then a member of the Agricultural Chemicals Unit of MAF and Registrar of the Pesticides Board. Now Principal Adviser (Toxicology) in the Science Group of NZ Food Safety Authority.

- iv. It was recorded that the Noble health study<sup>22</sup> had not considered some conditions which are more of an issue in New Zealand than in North America, such as chronic fatigue syndrome.
- v. The question of residues of the spray was considered. The need to consider the implications of repeated exposure for increased sensitivity needed further attention.
- vi. The issue of the persistence of *Btk* in the environment was noted.
- vii. The need for severe asthmatics to take care was also noted.<sup>23</sup>
- viii. Measurement was required of the amount of spray in the air that people would be exposed to, and how much would be in a house that had its door and windows closed. Shortly after the first spray operations had been carried out some air sampling had been done during and after the spray, which showed that the *Btk* was largely gone from the air after one hour. There had been difficulties with taking indoor samples, but it was possible to say that while concentrations were definitely much lower inside, going inside did not prevent exposure.<sup>24</sup> Further air samples taken from inside houses showed that the spray did not get into a well sealed house, but otherwise it got in at low levels. 98% of the spray was said to have gone from the air after 90 minutes.<sup>25</sup>
- ix. A question arose as to whether the spray to be used in Auckland was exactly the same as that used in Vancouver, which had been the subject of the North American data on which reliance was being placed. Although at first it was thought there was no difference, later the Panel noted a slight difference between the batch of *Btk* Foray 48B used in Vancouver and that to be sprayed in Auckland. It was emphasised that it was necessary to confirm whether or not the two were the same, and Dr Reeve was asked to determine if there was any difference and report back to the panel, which he agreed to do, in writing. It appeared that there were small differences between the Abbot's formulation and Novo Nordic's formulation of Foray 48B, such that it appeared that the Abbot's formulation was the safer, though one could still not say that there would be no reactions.
- x. Dr Reeve was questioned about the inert ingredients of *Btk* Foray had 48B. The panel needed to be completely satisfied that the ingredients of Foray 48B had been fully assessed. Dr Reeve confirmed that he was quite sure that the spray had no harmful properties, and that he would be willing to communicate directly on this issue with those carrying out the health impact assessment study. Dr Reeve was asked about an ingredient reported to be in the spray called methyl paraben. He said that this was just an anti-oxidant. It was stated that

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<sup>22</sup> Believed to be a Canadian study.

<sup>23</sup> Paragraphs vi and vii are based on paras. 4, 9, 12, 15, 17, 23, 30, and 45 of the Minutes of the Panel meeting of 1.8.96

<sup>24</sup> Panel Minutes -15.10.96 – para.50

<sup>25</sup> That of course has to be read in the light of the difference of concentration in spray in Eastern as opposed to Western Auckland, and Hamilton.

all but methyl paraben are used in food cosmetics and therapeutic substances, though they may still have potential to cause hypersensitive reactions. The Ministry of Health expected exposure in this instance to be very low, but they were to investigate further one of the ingredients, benzoate, a known asthma sensitiser.

- xi. As to the question of the release of the Abbot's formula, it was suggested that as it had been released to the Agricultural Chemicals Unit, the Ministry of Health and to AerAqua that was sufficient, but as it was thought that such release would be insufficient to address individuals' concerns the question would be further followed up.
- xii. The low-flying height of the plane was considered in some detail, especially as it was noted that it was something that people would never have experienced before. At a later meeting the Panel expressed its concern about the need for confirmation of timing of the aerial spray operations particularly in order to be able to tell people how long spraying would take.

3.14 The Chairman expressed the tentative conclusion that "on the basis of all the available evidence there seem to be a very low health risk, but that as the spray had not been tested on the New Zealand population, the issue became one of risk management."<sup>26</sup> The Panel confirmed that they were still in favour of eradication as the preferred option. It was agreed that Ministers would be advised that there was scientific merit in a well-designed health study, especially in light of repeated sprayings.<sup>27</sup>

3.15 The Panel Minutes and some of the issues mentioned in the Cabinet papers raised a number of important questions to which no actual answers are recorded.<sup>28</sup> In the Cabinet papers there is also reference to the importance of a friendly public, the need for good communications and close consultation with the public on all details of the operations.<sup>29</sup> However, by September 1997 it was reported to Cabinet that:

"Government appears to have broad, but reducing, community support for pursuing eradication. There is strong opposition to continued aerial spraying in particular, from some individual residents within the spray area. It is the Ministry of Forestry's view that community concern within Auckland's eastern suburbs is not sufficiently strong *at present* to preclude aerial spraying as an option. However, immediate resumption of aerial spraying would result in a significant loss of civic trust."<sup>30</sup>

<sup>26</sup> Tussock Moth Science Panel Minutes – 1.8.96 para.12 [Doc 3B]

<sup>27</sup> These three paragraphs are based on paragraphs 17 to 25, and 29, 31, 33 and 34 of the Panel Minutes of 26.7.96.

<sup>28</sup> By way of example only, from the Minutes of 26 July and 12 August 1996:

- Determine maximum BTK intake of the person standing outside during spraying.
- Identify health research needs, e. g. for pregnant women, chronic fatigue syndrome, etc.
- Advise ministers that there is scientific merit in well-designed health studies, especially in light of repeated sprays.
- Health issues - inert agents in Foray 48B and possible risks (food allergies).

<sup>29</sup> CIE (96)92 – App.I – 17.6.96; CAB(96)M27/12 – 22.7.96 – [Doc 3AA]

<sup>30</sup> CIE (97)119 para.46 – 1.9.97 – [Doc 3AA]



Perhaps some lessons regarding public relations and the provision of information learned during that operation were unfortunately overlooked when dealing with West Auckland and Hamilton.

- 3.16 The Sinclair Review Panel produced its report in March 1997.<sup>31</sup> It went to Cabinet in April 1997, before the WSTM eradication programme had been completed. As two of the three members of the Panel were scientists of some standing it is perhaps not surprising that the report has much to say on scientific issues. This is not to belittle it because the science involved was of considerable importance, but it is noteworthy that it has very little to say about human health. Its major comment is:

*"The human health implications of spraying with Btk:* It was recognized that expert input was crucial on this issue but there were again some relationship problems between MoF, the Ministry of Health and the Health provider (A+) which took some time to be resolved. The impacts were not serious and any faults involved were minor, but that was in large part because Btk turned out to be an excellent choice from a human health perspective, i.e. having no significant impacts."

That might seem a somewhat surprising conclusion since the spray programme had not been completed at the time of the report and, from what I can ascertain, little investigation had been carried out regarding the actual effects on the population.

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<sup>31</sup> [Doc 4AB] para.2.4

#### 4. Operation Ever Green - progress

4.1 In August 1996 the Ministries of Forestry and Health commissioned a Health Risk Assessment from the then Auckland Healthcare Services Ltd (AHSL), the terms of reference for which were submitted to the Ministry of Health on 7 August 1996. Team work commenced the following day, and the final report was completed on 27 August, and was approved and published by the Ministries of Health and Forestry on 4 September 1996<sup>1</sup>. An Addendum was added on 26 September 1996.

4.2 From the outset of the programme complaints from the public were addressed both to the Ministry of Forestry and to Auckland Healthcare. From March 1997 the Ministry of Forestry engaged Dr Francesca Jenner (now Kelly, and the proprietor of (now) Aer'aqua Medicine Ltd), to be its medical adviser. Dr Kelly had been part-author of the 1996 Health Risk Assessment.

4.3 In September 1997 a further Assessment was prepared in anticipation of a control programme for 1997/98. This reported on health effects since the 1996/97 programme. The 1997 Assessment noted that there was no evidence of increased attendance at an Accident and Medical Centre in October 1996 when compared with the previous month or the corresponding period in 1995. However, the "Bugline" set up by the Ministry of Forestry and Auckland Healthcare received complaints from 278 complainants identifying 682 specific symptoms (some, no doubt, by self diagnosis) comprising:

- respiratory symptoms (including 12 percent relating to asthma) – 40 percent.
- headaches (specifically mentioned) - 18 percent.
- skin irritation or rash - 30 percent.
- eye irritation pain or redness - 31 percent.
- diarrhoea - 2 percent.
- general symptoms, such as lethargy malaise etc - 28 percent.
- concern about the potential future health effects as a consequence of the spray -15 percent.
- inconvenience and social disruption resulting from Operation Ever Green - 9 percent

The Ministries have objected to my omission to distinguish some of these from direct physical effects of the spray. I accept that the last two items are not strictly physical effects - but serious and prolonged worry can lead to physical effects.

4.4 There was no evidence to support an alleged increase in the incidence of prematurity or miscarriages, and while there were a few laboratory reports involving *Btk* with infections, *Btk* was not judged by clinical staff as being causally associated with disease.<sup>2</sup>

<sup>1</sup> Health Risk Assessment of Btk Spraying in Auckland's Eastern Suburbs to eradicate White spotted Tussock Moth (September 1996) para.3. [Doc 4A and 4AA]

<sup>2</sup> Health Risk Assessment - Eastern Suburbs of Auckland (September 1997) pp.8–10 [Doc 5]

- 4.5 The Ministry of Forestry commissioned a series of surveys of residents in the original spray zone the last being conducted on 28/29 June 1997. A total of 721 persons participated (an average of around 80 households per suburb) and 322 of these were residents of the areas that receive the most intensive spraying, i.e. Mission Bay, Kohimarama, Meadowbank, and Orakei. Most were concerned about the damage that the Moth might cause, as distinct from the effect of spraying on humans.
- 4.6 In response to the question **"Do you believe that anyone in your household (only household members) was affected by the Btk spray which was used?"**, between 8 and 10 percent replied in the affirmative, and when asked about the symptoms 91 percent of those were similar to the symptoms referred to above. 14 percent of such people had sought some form of medical advice.
- 4.7 In the 1996 Health Risk Assessment consideration was given to possible effects on skin, nose, lips and eyes, and upon people with allergies/atopic dispositions. The conclusion reached was that any such adverse reactions were unlikely to arise.<sup>3</sup>
- 4.8 In 1997 the Ministry of Forestry commissioned from AHSL advice on whether the recommendations contained in that assessment remained valid. AHSL was also to report on the health risks for a further more limited moth pest management programme, and to make recommendations for mitigating public health risks should the programme go ahead.
- 4.9 The 1997 Assessment, which had noted those complaints, said of them:
- "The majority of residents had few complaints. Of those that did, these fell into a handful of largely minor irritations, few of which were severe enough to warrant seeking medical attention. Of the two thirds who suggested recommendations, most wanted ground spraying only or a delay in spraying until further community input or scientific research into possible long-term effects of repeated spraying could be undertaken..."<sup>4</sup>
- 4.10 Yet the reactions, described as "minor irritations", appear to be exactly those which are summarised in para. 4.3 above. Nor is there reference to the report at the meeting of the Tussock Moth Science Panel on 13 November 1996 from the representative of the Ministry of Forestry of an incident arising out of the spray in which a number of individuals at St Patrick's Primary School, Panmure, appear to have suffered some ill-health effects. The Ministry deployed a dozen staff who warned schools and other groups that the plane was about to pass in about 10 minutes allowing them to get inside and close doors and windows etc. Another incident, about Kohimarama Primary School, is recorded in a magazine article dealing with Operation Ever Green.<sup>5</sup> It appears that although a number of staff and pupils were affected by sore throats, respiratory illness and fatigue, no reports by them were made to Auckland Healthcare, with the consequence that these events did not enter the official statistics. There may or may not have been other such occurrences.

<sup>3</sup> Health Risk Assessment 1996 – paras. 7.6.1 – 7.6.5 [Docs 4 & 4A]

<sup>4</sup> Health Risk Assessment of the proposed 1997/98 programme - Eastern Suburbs of Auckland (September 1997pp.15 -17 [Doc 5]

<sup>5</sup> "Veil of Fears – Is the Tussock Moth Spray making people sick?" – North and South – July 1997 – [Doc 4B]

4.11 The proposed 1997 spray programme (for which the 1997 Assessment was prepared) never went ahead. The reason for that was that it proved to be unnecessary. The minutes of the Cabinet Economic Committee of 24 June 1998 show that in December 1997 6500 tussock moth pheromone traps were placed throughout the known infested area, and in identifiable risk locations outside that area. By 25 May 1998 no moths had been captured.<sup>6</sup>

4.12 The then Minister for Biosecurity, the Hon Simon Upton, presented to the Cabinet Committee on Industry and Environment a paper dated 10 November 1997, entitled "*White Spotted Tussock Moth Eradication: Results of final revised cost benefit analysis*".<sup>7</sup> The Summary states, in part,:

"2. There is a range of science views on the potential for tussock moth to spread, cause damage and affect trade. Because of this, it is not possible to estimate the likely economic impact of tussock moth with any certainty.

"3. The NZIER CBA identifies and quantifies benefits of eradicating tussock moth to the urban amenity environment, particularly in Auckland. These benefits alone are shown to justify the costs of eradication.

4.13 The paper is lengthy, but for present purposes it is sufficient to quote paragraphs 21 - 23 of the Comment:

"21. The NZIER study highlights the economic consequences of the moth as they are presently understood. The NZIER findings indicate that tussock moth eradication is likely to be economically worthwhile based on avoided costs to the urban amenity environment alone (Auckland City and other urban areas). The report is conservative in that identified benefits of eradication to areas such as indigenous forests, commercial planted forests and the non-organic horticulture industry, which were considered low, were not included. Real human health impacts, which are likely to be experienced by a small number of people, were also not included, and there are differences of opinion over the potential for tussock moth to result in trade costs.

"22. All the basis of information currently available, the exclusion of these benefits is not expected to significantly alter the benefit: cost ratio. It should be noted, however, that because tussock moth is a little studied pest, there are significant biological uncertainties, and therefore its potential future impacts in New Zealand are not fully understood. The Ministry of Forestry, in consultation with the Ministry of Agriculture and the Department of Conservation, is commissioning the New Zealand Forest Research Institute to carry out further feeding trials this spring.

"23. The report is also likely to understate the cost of eradication, in that disruption effects to the community from spraying and trapping are not quantified. These could include anxiety and stress. It also understates the benefits of eradication because it excludes the "peace of mind" benefits to those who prefer a moth free environment. Such benefits are difficult to quantify."

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<sup>6</sup> ECO (98) M 16/3 [Doc 9 AAA]

<sup>7</sup> [Doc 9 AAA]

## 5. Health Surveillance following Operation Ever Green

- 5.1 Although outside the chronological sequence of events, it is desirable to refer here to the Health Surveillance carried out following Operation Ever Green, which was reported to the Ministry of Agriculture and Forestry in May 2001<sup>1</sup>, but appears not to have been formally referred to the Ministry of Health. The survey was carried out by Aer'aqua Medicine Limited. A great deal of very detailed information was gathered. The report appeared before the commencement of the major aerial spraying in relation to the Painted Apple Moth, and the outcomes reported in it no doubt influenced the MAF's approach to complaints arising from that project.
- 5.2 A Steering Committee chaired by Dr Francesca Kelly, and comprising the Medical Officer of Health, Auckland, and representatives of the Auckland University Medical Faculty and Wellington School of Medicine was established. Services were provided for people to report health concerns. The Health Risk Assessment reports were made readily available.
- 5.3 Table 2 of the Health Risk Surveillance, which follows<sup>2</sup>, shows a list of the various symptoms reported. The most frequent instances are similar to those mentioned earlier in this report. A copy of Figure 5, which follows<sup>3</sup>, illustrates the concerns of the 375 people who self-reported symptoms. Two sentinel general practitioners were appointed to whom complaints could be made. That study showed that no adverse patterns were found.
- 5.4 There was also a voluntary register of individuals established who were exposed to the spray<sup>4</sup>. The register can be accessed to assist future scientific health studies. I am informed that the register includes 1,153 registered households, and 3,144 registered individuals.
- 5.5 Appendix 6 (para. 9.6) to the report lists the days on which aerial spraying took place.<sup>5</sup>
- 5.6 At section 4 of the Executive Summary reference is made to the 375 individuals mentioned above who reported various concerns which are listed there. As to them, the report states:

"Reported concerns were followed up through a process of interview, requests to consent to obtain relevant information from healthcare practitioners, review by a panel of medical specialists of recorded concerns and any available medical information, and where appropriate additional personal medical assessments. This process did not identify any significant diseases attributable to the spraying.

"For three years from the start of Operation Ever Green, general medical practitioners in the area were asked to inform the Medical Officer of Health about any health problems which they thought might be associated with spraying. There were no systematic problems reported and no further individual reports after mid-1997.

"Many of the 375 individuals reporting health concerns had not consulted a medical practitioner about those concerns. However, their concerns were part of

<sup>1</sup> Health Surveillance following Operation Ever Green **bDoc 11]**

<sup>2</sup> Ibid. pp. 14/15

<sup>3</sup> Ibid p.17

<sup>4</sup> Placed in National Archives (Auckland Registry Office)

<sup>5</sup> see Para 3.8 above.

the spectrum of symptoms commonly taken to a family doctor. It was considered that patterns of consultation observable within general medical practices (family doctors) could indicate whether any change in frequency of health conditions was associated with spraying."

5.7 In section 5, the outcome of the Sentinel General Practitioners Study is summarised.

"Health presentations studied were:

Asthma, lower respiratory other than asthma, upper respiratory, rheumatoid arthritis and other autoimmune disorders, chronic fatigue syndrome, headaches, conjunctivitis, dermatitis.

"Based on the two practices, no adverse patterns were found. In particular, there was:

- no identified new onset of asthma during spraying;
- no pattern of increased consultation from pre-existing asthma associated with spraying;
- no identified chronic fatigue syndrome associated with residents in a spray area;
- no increase in presentations for autoimmune disorders nor any increase in consultation rates by people with pre-existing conditions;
- no increase in consultation rates for lower respiratory problems, which include serious lung diseases;
- no obvious pattern of problems with headache, eye, skin or upper respiratory symptoms."

5.8 The Executive Summary concludes with the following three paragraphs:

"A comprehensive health surveillance programme has examined health outcomes for a period of two years -using individual, local, regional and national health information. This included investigating residents' self-reported health concerns, consultation rates at sentinel family doctors, and a review of health data sources to establish birth outcomes and other events of community concern.

"No adverse health patterns were found, once patterns were examined at a population level. The frequency of occurrence of the following was no different from natural variation: early births; small babies; birth defects; consultation rates with sentinel family doctors for asthma, other respiratory problems, headaches, skin or eye symptoms, and autoimmune disorders.

"There was a pattern of self-reporting by residents to MAF for irritant respiratory, skin and eye symptoms at the time of spraying and a level of expressed concern about potential future disease. A voluntary register of residents exposed to the longer duration programme was well supported and has been placed in the National Archives (Auckland Regional Office) to assist with any future health studies."

5.9 The report was peer reviewed by a team of medical specialists. It shows that while symptoms were displayed and reported by 375 people, out of over 80,000 in the spray area, these were relatively mild passing problems anticipated by the Operation Ever Green Health Risk Assessment and exhibiting no evidence of continuing illness. However, reference to figure 5 of the survey shows that of those 375 people, only 62 had a past history of such ailments. While these may be described as passing symptoms, those afflicted would not necessarily know that, and in all the circumstances may well suffer some anxiety in addition to the disruption to their lives.

5.10 It is noteworthy that there does not appear in East Auckland to have been the volume of local expressions of concern which occurred in West Auckland and in Hamilton. The West Auckland operation, however, was far more extensive in time, area and spray population; while the Hamilton operation was a very concentrated shorter strike on a small area. There may also have been heightened public awareness of toxic issues with the passage of time.

5.11 In a submission the Ministries have cautioned me against concluding, without adequate scientific analysis, that the differing factors of frequency, duration, and intensity of spraying were causative of the increased concerns reported from West Auckland and Hamilton. The pattern can be seen from the following table:

**TABLE 1 – Spray comparisons<sup>6</sup>**

| Programme | People reporting sick | Population in spray area (approx) | Percentage reporting sick (approx) | Frequency of spraying | Duration of spray programme (weeks) |
|-----------|-----------------------|-----------------------------------|------------------------------------|-----------------------|-------------------------------------|
| OEG       | 375                   | 86,000                            | 0.4                                | 9/30 wks              | 30                                  |
| PAM       | 3500 (figs,vary)      | 193,000                           | 1.6                                | 40/104 wks            | 104                                 |
| AGM       | 855                   | 24,000                            | 3.6                                | 1/8wks                | 8                                   |

5.12 As appears from Table 2 below<sup>7</sup>, the residents of parts of Hamilton appear to have been subjected to almost twice as much spray over their 52 days spray period as did the residents of West Auckland over any comparable period.

5.13 I note that in Dr Di Marco's report to the Waitakere City Council he refers to Foray 48B as being "an aqueous liquid concentrate formulation specifically designed for low volume and ultra low volume spraying". I cannot recall seeing anywhere an authoritative definition of what is regarded as "low volume" in this particular context of spraying over concentrated residential areas.

5.14 The reliance on Operation Ever Green outcomes for the purposes of the PAM or AGM programmes is now largely only of historical interest. Further information has been provided to me, but I am left with the impression of a want of co-ordination of the various work that has been done, and I remain of the view that further research into the relationship of frequency, duration and intensity of sprays is desirable.

<sup>6</sup> Prepared in my Office.

<sup>7</sup> Para.13.5

## 6. Painted Apple Moth incursion

- 6.1. Painted Apple Moths (PAM) were first identified in Glendene on 5 May 1999 and by October 2001 had been found in the surrounding suburbs of Kelston, Avondale, Titirangi and Glen Eden, and had also been found in Mount Wellington. It is this incursion which has given rise to the need for this report.
- 6.2. The moth is of the same family as the Asian Gypsy Moth and White-spotted Tussock Moth. Although it differs somewhat in its feeding and breeding habits, like them it is susceptible to Foray 48B. An economic impact assessment carried out by MAF conservatively estimated that potential (net present value) costs of \$48 million could be incurred over the next 20 years to plantation forestry, and private and public amenity planting, if PAM became widely established. There would likely be additional, but at that point unestimated, impacts on the conservation estate.
- 6.3. In August 2000 Cabinet agreed that MAF should pursue eradication of PAM during 2000/01 and 2001/2002 using broadly the same strategy as was then being employed, namely ground spraying and host removal.
- 6.4. In May 2001 Cabinet approved the use of the funding for 2001/02 to be available for continuing the response and agreed that MAF should continue its then current response until it was able to establish the full geographical distribution of PAM in Auckland.<sup>1</sup>
- 6.5. On 8 October 2001 Cabinet gave the Cabinet Finance Infrastructure and Environment Committee power to act to consider and make decisions on the preferred option for the management Painted Apple Moth.<sup>2</sup>

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<sup>1</sup> The material in paragraphs 6.1 to 6.3 is based on the Minister of Biosecurity's paper "Government response to the invasion of Painted Apple Moth" attached to FIN (01) 188.

**[Doc 13A]**

<sup>2</sup> FIN (01) 188 - 12.10.01 **[Doc 13A ]**



## 7. Ministerial paper: October 2001

- 7.1 As at October 2001, the PAM population at Mount Wellington had likely been significantly reduced, but in the West Auckland suburbs the populations had persisted within known infested areas. Infestation was in riparian vegetation where ground spraying had not been able to achieve complete coverage, and especially in some 300 hectares around the Whau River estuary and the Waikumete cemetery.
- 7.2 The Ministerial paper referred to above<sup>1</sup> indicated that there were four options which were seen as available to the Government, one being to do nothing, and another being to establish a long-term management programme aimed at controlling the economic and environmental impacts of PAM. Neither of those was considered attractive, but the two remaining options had support, namely pursue eradication by further ground spraying and use of targeted aerial spraying, or pursue eradication by further ground spraying and use of aerial spraying across the entire area of infestation.
- 7.3 The Paper then goes on to promote the former option (ground spray and the targeted aerial spray) as being the current operational measures enhanced by the use of additional targeted aerial spraying over an area of up to 600 hectares in the West Auckland suburbs. MAF's proposal was to use targeted aerial spraying of the 300 hectare area around the Whau River margins and Waikumete cemetery, but if monitoring detected persistent populations in other areas of high intensity phase two would commence, involving targeted aerial spraying of those other areas up to the 600 hectares mentioned above. If that did not appear to be succeeding MAF would report back to Cabinet by 31 March 2002 with options for further action.
- 7.4 At that stage it was considered that aerial spraying across the entire area of infestation, some 9000 hectares, may have a higher probability of successfully eradicating PAM, but at a cost of up to at least \$20 million over three years, and in addition, significant community opposition, together with possible threats posed to native moths and butterflies. Up to that point the eradication programme had cost \$2.5 million, and it was anticipated that the preferred option of targeted aerial spraying could be expected to cost between \$7.9 million and \$11.1 million over three years compared to \$20 million over the wider area mentioned above. It was estimated that the quantifiable economic impacts avoided through eradication of PAM would well exceed the upper estimate of the preferred option, but of course would be lower in relation to the entire area spraying. The preferred response was seen as having a better benefit to cost ratio, as being likely to result in less public opposition, posed lower threats to native caterpillars, and maintained the option of moving to entire area spraying if necessary.
- 7.5 The Paper refers to the legal, environmental and conservation, health, and Maori issues, and details of response management. Of significance for present purposes are the references to the Resource Management Act constraints, and the involvement of the Department of Conservation in relation to the conservation estate. MAF considered that as the issue was of national significance, the decision should be made at the national level by way of existing Regulations, rather than at regional level under a District or

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<sup>1</sup> [Doc 13A] – para 6.4 above

Regional plan. In the event, the problem was resolved at national level by the enactment (in 1997) of an additional section 7A to the Biosecurity Act, 1993.<sup>2</sup>

- 7.6 As Foray 48B was not then registered to cover PAM, MAF was facilitating the extension of the label to extend to that Moth.
- 7.7 On the topic of human health, the paper refers to the outcome of Operation Ever Green and states, "no adverse health patterns were found, once patterns were examined at a population level". That is a direct quote from the Health Surveillance Report<sup>3</sup>. The paper refers to the Health Advisory Steering Group which had been set up.
- 7.8. The phrase "No adverse health patterns were found, once patterns were examined at a population level" became frequently cited in the reports that went to Ministers. It is a statistical interpretation which I understand to mean that the health conditions found were not greater than one would expect if there were no spray. Specifically, although some individuals reported adverse health conditions or concerns during or immediately after the spraying, the number of these and severity of them was not greater than what was reported in the same population in the time period before spraying. In that sense no doubt the phrase has its value in the creation of health statistics.<sup>4</sup>
- 7.9 However, it seems to me that the repeated use of the phrase in papers to Ministers may have somewhat played down possible danger to individuals. At an earlier stage the then Cabinet had been informed that the Ministry of Health "is satisfied that Foray 48B contains no materials which, under the conditions of use, present an unacceptable public health risk"<sup>5</sup>, and that "*Btk* turned out to be an excellent choice from human health perspective, i.e. having no significant impacts."<sup>6</sup>
- 7.10 Where one has some event not naturally occurring but imposed on a particular community, the use of a statistical measure, or somewhat generalised statements, may be misinterpreted and so hide the facts. The fact is that through Operation Ever Green some 375 people felt themselves sufficiently unwell to report their discomfort and in some cases to seek medical advice. As a percentage of the total community potentially capable of being affected, the actual number of course is small, but is nevertheless still significant in terms of individual discomfort.
- 7.11 A November 2001 memorandum put it a little differently by reference to an independent health monitoring and support programme of which an integral part was the establishment of the health register for residents with particular health concerns. Some 60 people at that stage had registered and would be individually contacted by a doctor to discuss their concerns and the precautions they should take. It was also noted that the Auckland Health Board's Medical Officer of Health had commissioned an independent health risk assessment which would include recommendations on precautions

<sup>2</sup> Ministerial paper - paragraphs 43-48.

<sup>3</sup> Surveillance following Operation Ever Green - May 2001: **[Doc 11]** – see Part 5 above

<sup>4</sup> See also para 13.42

<sup>5</sup> See para. 3.10 .v. above

<sup>6</sup> See para. 3.14 above

residents might wish to take to avoid any effects of the spray.<sup>7</sup> In addition, it was stated,

"[Foray 48B] is specific to caterpillars and does not harm animals, fish or people. An independent health study was undertaken as part of Operation Ever Green which found no evidence of adverse health effects in residents, other than minor short-term respiratory and skin complaints".

- 7.12 Referring to the eradication measures themselves, it was said that aerial spraying would commence in late November 2001 and would involve the use of a BK117 (or similar) helicopter. MAF anticipated that the sprays would be carried out at three to four weeks intervals, and in ideal conditions 6-8 sprays would be capable of achieving eradication. This information was enhanced in the memorandum of November 2001 which reported that spraying was expected to occur between 5 a.m. and 7 a.m. when the wind would be calmest, thus keeping to a minimum spray drift from the proposed 20 to 30 metre strips.
- 7.13 With reference to communication with the population, MAF noted that it had had meetings with the Community Advisory Group and that there was support for eradication, but some opposition to aerial spraying and a high level of concern about health and environmental issues that might arise. A survey of 600 people resident in the West Auckland suburbs had revealed a high level of awareness amongst the general public about PAM - some 60%, strong support for eradication – 86%, and the use of targeted aerial spraying if necessary, for which support was given at 70%.<sup>8</sup>
- 7.14 The appropriation sought on the basis of undertaking the high intensity phase of the programme was to be \$4.9 million in the year 2001/2002 rising to \$5.4 million in the following year.
- 7.15 It was also noted that the Waitakere City Council, while supportive of eradication, had expressed strong concerns regarding the use of aerial spraying.<sup>9</sup>
- 7.16 The Director-General of Agriculture has argued<sup>10</sup> that this was the point of decision to move to aerial spraying. While certainly it authorised the limited aerial spraying mentioned below<sup>11</sup>, there was a vast difference of magnitude between that and what was to follow during the period October 2002 to April 2003.

<sup>7</sup> Memorandum: Director, Forestry Biosecurity - Director General, MAF.: 22.11.01 **[Doc 14]**

<sup>8</sup> It is unclear whether this relates to the surveys conducted by Venture Research in November 2002 **[Doc 28]** and April 2003 **[Doc 50]** both of which I have seen, or to some other survey. November 2002 seems the earliest.

<sup>9</sup> .See paragraph 13.12 below, where I refer to the similar problem faced by the Hamilton City Council.

<sup>10</sup> **[Doc 71B]**

<sup>11</sup> Para. 9.1

## 8. Ministerial papers - December 2001

8.1 On 5 and 6 December 2001 separate reports were sent by the Director-General of Agriculture to the Minister for Biosecurity and to the Prime Minister. That to the Minister<sup>1</sup> reported the catching of a total of 968 moths in the latter two weeks of November. Certain single catches outside the West Auckland area were discounted, but the catches in Oratia and the Waitakere Ranges were of concern.

8.2 The report also mentioned that ERMA had decided that the latest batch of Foray 48B was a different hazardous substance from the original formulation in that it contained an additional component, namely BIT, which was considered likely to significantly change the activity of the original formulation, thus giving it a different hazard profile.

However, by 12 August 2002 ERMA had received additional information which enabled it to form the view that there was no significant difference between the two formulae.<sup>2</sup>

8.3 The paper then goes on to deal with the difficulties that had arisen with the Waitakere City Council in respect of aspects of its District Plan under the Resource Management Act which would have made the proposed spraying by helicopter from the proposed site a breach of the Council's noise control bylaws. To proceed would have been a breach of the District Plan and require the obtaining of resource consent, which in the circumstances would likely lead to appeals to the Environment Court, and probably delay the process by many months. It appears that the Council would have preferred MAF to have used the emergency provisions under section 7A of the Biosecurity Act. However, MAF obtained an opinion from the Crown Law Office, which concluded that the rule in the Waitakere City Council's plan was unlawful.

8.4 The paper then examined four options:

- ignore the rule,
- obtain an Environment Court declaration,
- make a declaration of a biosecurity emergency,
- seek Ministerial exemption under section 7A of the Biosecurity Act.

At that point the impasse had not been resolved. 3

8.5 The paper to the Prime Minister<sup>4</sup> covered the matters indicated above, but commenced with an italicised paragraph stating:

"Painted Apple Moth is a native of Australia where it is a sporadic pest, partly because population levels are affected by pesticides which are applied to trees to control other pests. In New Zealand the threat is to our forestry, horticulture and environment where there are few natural controls. It can feed on young pine trees (up to about eight years) affecting their growth. The pest was found in Glendene in May 1999 and has since been discovered in the West Auckland suburbs of Avondale, Glen Eden, Kelston, and Titirangi, as well as Mount

<sup>1</sup> Memorandum: Director, Forest Biosecurity – Minister for Biosecurity: 5 December 2001 **[Doc 14A]**

<sup>2</sup> Letter - ERMA/MAF – **[Doc 18AB]**. I deal with this more fully below – para.15.29

<sup>3</sup> See Part 17 as to the use of section 7A

<sup>4</sup> Memorandum: Assistant Director General/Group Director Biosecurity Authority – Prime Minister: 6 December 2001.**[Doc 14AA]**

Wellington some 15 kilometres away. It feeds on many different types of plants but particularly likes wattles and acacia trees. It has also been found feeding on kowhai, mountain ribbonwood and, recently, karaka. If it spread, the economic cost of the country is estimated to be at least \$48 million over 20 years (net present value)."

- 8.6 The paper repeats the quotation from the Operation Ever Green Health Study,

"[Foray 48B] is specific to caterpillars and does not harm animals, fish or people. An independent health study was undertaken as part of Operation Ever Green which found no evidence of adverse health effects in residents, other than minor short-term respiratory and skin complaints."

Under the heading "Advisory Groups", after reference to the Technical Advisory Group and an interdepartmental officials group, it is said,

"a community advisory group includes representation from interest groups such as the Asthma Society and Community Boards as well as local residents. It is a polarised group, with about half supportive of the programme and the other half trying to stop the operation or proposed alternative methods of eradication."

- 8.7 The difficulties with the Waitakere City Council's District Plan are also discussed, and it is said that relations have at times been tense although there is said to be a shared aim of eradication with a minimum of disruption to residents. This paper has attached to it an aerial photograph of the main areas of concern showing the surrounding areas to be quite densely developed. A copy of the aerial photograph is attached.

## 9. Spraying commenced

- 9.1 Spraying commenced in January 2002 over some 500 - 600 hectares, and continued at that level until early June. The area was gradually enlarged to approximately 900 hectares (reached in September 2002) by an interim containment programme approved by Cabinet in July 2002, just ahead of the general election which was held on 27 July 2002.<sup>1</sup>
- 9.2 This involved 9 sprayings, mainly from a helicopter but latterly also from a fixed wing Air Tractor, on 4 days in January, 3 in February, March, and April, 2 days in June, 1 in August and 2 in September. These were directed mainly at areas adjacent to the Whau River and the Waikumete cemetery, as it had become apparent that ground spraying of these areas was proving ineffective.
- 9.3 I have recently obtained access to Cabinet papers prepared very shortly before the General Election of 2002.<sup>2</sup> It is not necessary for present purposes to set out in detail all they contain, but they do show that during the relevant period in June/July 2002 MAF and Treasury did not support a full-scale eradication programme. Rather, they supported a long-term management option – Treasury strongly so.
- 9.4 It was of course right that MAF should indicate all the likely options and, in the circumstances, unsurprising that the Government chose the interim short-term solution. MAF expressed some concern that the full-scale eradication programme would generate significant public opposition which might well cause difficulties for the Ministry in the event of it being necessary to carry out a similar operation but in relation to more serious pests, or outbreaks that demanded urgent and strong measures. In relation to the proposal to extend the spray area from 8000 to 12,000 ha (or, as is pointed out, to two-three times the maximum area sprayed in the white spotted tussock moth programme) the Minister of Biosecurity's submission stated,

"MAF considers that there are significant issues around the technical feasibility and safety of such a programme that would need to be resolved before this option could be implemented".

While I entertained some doubt about the resolution of the technical and safety issues, the material now provided to me satisfies me as to the existence of the issues and of their appropriate resolution.<sup>3</sup>

- 9.5 In these papers there is some reference to the human health, but the emphasis appears to be on the possibility of harm from the moth itself, rather than from any spray operations. The Ministry of Health was consulted in relation to these papers, but there is no recorded comment from the Ministry, and certainly no reference to the safety concern quoted above. I am now informed (see Ministries' Schedule para-9.05):

"You also note that there is no comment from the Ministry of Health in this paper. Refer our earlier explanation of the Cabinet process (page 4). The Ministry of

<sup>1</sup> Details of the aerial spray operations – [Doc 23].

<sup>2</sup> CAB (02)315 – 21.6.02 - especially Ministerial paper attached - paragraphs 22 to 29, 50 to 61, and 62 to 66. CBC (02) 80, dated 28.6.02, CBC(02)80A dated 1.7.02, CBC Min(02)5/1 of 3.7.02, and CBC Min (02) 7/1 of 28.8.02, with their respective attachments. [Docs 17A, 17B, 17C and 18A]

<sup>3</sup> MAF folder – Aerial Operations, Technical Issues – Jan – Dec 2002 [Doc MAF 1]

Health (as previously advised to your office) was fully consulted in relation to all papers where the Ministry is shown as having been consulted. The absence of attributed comment, by Cabinet Office convention, indicates support for the statements made. In many instances the wording of text may have been prepared by Health officials, or jointly by MAF and Health officials, in papers submitted by the Minister for Biosecurity. The Ministry of Health was directly accountable to the Minister for Biosecurity through its Output Plan and Purchase Agreement with the Minister for Biosecurity."

As I shall indicate below, in circumstances of this kind both the public interest, and ensuring Ministers' awareness, may be better served by a more obvious separation of the Ministry's involvement.

- 9.6 By 28 August 2002, by which time the new government had taken office, the Minister of Biosecurity's paper to the Cabinet Business Committee shows a complete change of front by MAF, which by then had aligned itself with the Department of Conservation and the Ministry of Research, Science and Technology in favour of a programme of total eradication. Only Treasury remained opposed, on economic grounds. The Ministry of Health saw no reason to differ.

## 10. Large Scale Spraying - Cabinet paper: August 2002

- 10.1 The new Government received a detailed report in August 2002<sup>1</sup> and agreed to pursue eradication of PAM with a programme involving 10 large-scale aerial sprayings during 2002/03 followed by repeated aerial spraying of residual PAM populations over a three-year period. MAF was directed to commence a review of the eradication programme early in 2003 and report back to Cabinet with a recommendation on whether to continue the programme by 30 April 2003.<sup>2</sup>
- 10.2 The proposal was that aerial spraying of the core area of between 8000 and 12000 hectares would be carried out 10 times on a 21-day cycle. There would be ground spraying too, and controls of vegetation. The proposed programme was expected to cost between \$64.9 million and \$88.3 million over a period of four years. It was noted that Treasury considered an eradication programme at an estimated cost of \$88.3 million over three years, in addition to \$23.3 million already spent, could not be justified on economic grounds.
- 10.3 The paper is comprehensive and deals at length with a variety of risks. MAF estimated the potential economic impacts to planted forests, horticulture and amenity values associated with the spread of PAM (on a present value basis) to range from \$58 million to \$356 million over 20 years.
- 10.4 On the basis of 12,000 hectares to be sprayed MAF indicated health monitoring and support programme costs ranging from \$10.3 million down to \$2.9 million over the years 2002 - 2005. Those costs would be somewhat reduced for the 8000 hectare programme.
- 10.5 Department of Conservation was concerned about significant damage to native ecosystems and especially in relation to kowhai and karaka.
- 10.6 Under legal issues the paper noted that the Biosecurity Act (Resource Management Act Exemption) Regulations 2002 exempted eradication actions from the requirements of Part III of the Resource Management Act. Consequently, no resource consents were required.<sup>3</sup>
- 10.7 Consents were required under the Conservation Act and the Reserves Act in relation to the conservation estate which had been given by the Director-General or the Minister.
- 10.8 At that time the proposed aircraft were to be a Fokker Friendship in addition to continued use of a helicopter, and (as it turned out) an Air Tractor, which has a 2500 l. spray capacity.
- 10.9 In the body of the Minister's paper there is one paragraph (paragraph 37) devoted to human health impacts which is expanded in paragraphs 11 to 13 of Annex 1. There is a somewhat longer paragraph dealing with significant negative community reactions. Although the number of inhabitants is stated,

<sup>1</sup> "Government response to the incursion of Painted Apple Moth - eradication or long-term management"- August 2002 -probably associated with CBC Min(02) 7/1 **[Doc 21]**

<sup>2</sup> Cabinet approval was actually 9 September 2002 but the report for 30 April was delayed for reasons not associated with this matter.

<sup>3</sup> See Part 17 below



and over \$10 million is authorised in CBC (02) 101 for the first year's expenditure on "Health monitoring and support programme", nowhere does there seem to be addressed the implications of a very much greater area being sprayed and in a more intensive manner, notwithstanding the Minister's acknowledgement (at paragraph 76) that the programme was on "on a scale that is unprecedented worldwide". There seems no appreciation of the impact on the inhabitants, and those passing through the area, of concerns about health (immediate or long-term), disruption to daily life in terms of avoidance of spray and clean up after the spray, and the disquiet likely to be experienced by many from aircraft flying at very low levels overhead.<sup>4</sup> These are experiences to which the majority of New Zealanders are not accustomed.

- 10.10 The paper provides for comment from other departments, and although the Ministry of Health is named as one, there is no recorded comment, from which I am invited by the Ministry to assume that the Ministry acquiesced in all that the paper proposes. I am informed that the Ministry of Health had no concerns with the proposal to move to expanded aerial operations.<sup>5</sup> Human health does not appear to be mentioned in the Executive Summary of the Minister's paper nor in the Cabinet paper itself.
- 10.11 There was then some discussion about the possibility of a long-term management plan, as an alternative to mass spraying.
- 10.12 The proposed start date for this expanded programme was the second week of October 2002. MAF expected to report to Cabinet by 30 April 2003 regarding the outcomes achieved.
- 10.13 In August 2002 Cabinet approved funding of \$44.228 million for the first year of the five-year programme indicated to cost \$88.254 million.<sup>6</sup>
- 10.14 The difference in impact on the West Auckland population between what was carried out up to September 2002, and what occurred between October 2002 and May 2003 is best appreciated by comparing maps of the sprays 9 and 14 on the following pages<sup>7</sup>, and noting the very much larger residential areas affected.

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<sup>4</sup> On the 33 days on which aerial spraying appears to have been conducted between 14 October 2002 and 14 May 2003 all three aircraft appear to have been involved. However, the record appears to be incomplete for 14 to 16 January 2003.

<sup>5</sup> Ministries' Schedule -10.9

<sup>6</sup> CBC M in (02) 7/1 – **[Doc 18A]**

<sup>7</sup> Provided by MAF – the latter ones should refer to the year 2003.

## 11. Partial Progress - Cabinet paper: May 2003

- 11.1 In May 2003 a further paper was produced.<sup>1</sup> It was said that the programme was making excellent progress, the eradication remain feasible and with a high probability of success. It recommended that the eradication programme be continued, but warned that measures over several years might be required including aerial spraying. Planning at that time was focused on operations for 2003/04. During autumn and winter aerial spraying was to be scaled back because PAM activity slowed appreciably during cold weather. Beyond winter it was proposed that provision be made for two further large-scale aerial sprays and ongoing small-scale aerial sprays through to 30 June 2004. Ground spraying and other land-based activities would continue.
- 11.2 Paragraph 7, as part of the Executive Summary, states:
- "MAF continues to work closely with relevant health and regulatory authorities to ensure that any risks to public health are appropriately managed. A PAM health service was established in January 2002 to provide support to residents with health-related concerns. The health service is provided at no cost to householders, and its services include clinical assessments, specialist consultations, payment of part prescription charges, and reimbursement of the costs of visits to community GP's. A number of additional health-related activities are underway or planned, including a public health review of community concerns. This review will be carried out by the Wellington School of Medicine, and a report will be presented to the Director General of Health later this year."
- 11.3 At the date of the paper, 10 large-scale aerial sprays had been completed. An 11th was to be completed shortly thereafter, as it was required as a precaution against warmer than expected autumn temperatures generating prolonged PAM activity. In between the large-scale operations smaller targeted aerial operations were carried out, and were supplemented by ground spraying and other ground-based activities.
- 11.4 The first large-scale operation commenced on 23 October 2002.<sup>2</sup> It covered some 8000 ha of the core area, but was extended to approximately 8500 ha from operation 3 after the detection of a PAM population at Pt. Chevalier. It was progressively reduced from operation 8, as the spray began to have a significant effect on moth numbers. On 18 December 2002 a discreet PAM population was detected in Hobsonville. The spray area was extended by 1500 ha around Hobsonville. By the completion of operation 11, the core zone was expected to be reduced to three adjacent areas totalling some 5100 ha. These are illustrated on the maps attached to the Cabinet paper, which shows the core zone as at 30 May 2003, plus the Hobsonville hotspot. Considerable human populations would likely still be included within those areas<sup>3</sup>.
- 11.5 While there appeared to be some confusion about the areas which were being sprayed at that time, I now accept that was not so.
- 11.6 The further aerial operations proposed for the period 1 July 2003 to 30 June 2004 were regular small-scale sprays targeting individually the seven

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<sup>1</sup> "Painted apple moth-review of the eradication programme" [Doc 55A]

<sup>2</sup> See [Doc 23]

<sup>3</sup> The maps in [Doc 55A] are as at 24 April 2003.

residual PAM populations within the core zone (these populations had been reduced to a combined area of about 1500 ha), and provision for additional regular small-scale sprays at up to five hotspots outside the core zone including Hobsonville. Additionally, it was proposed that provision be made for a maximum of two large-scale sprays within the core zone between September and November 2003. These took place in October and November 2003 over some 6500 ha. Small-scale operations recommenced in December 2003, and continued through to the completion of the programme on 13 May 2004.<sup>4</sup>

- 11.7 On the question of community relations the report refers to a Community Advisory Group established early in the PAM programme. That group was shut down in November 2002 because, "it became a vehicle for a small number of people with strong views opposing programme to register publicly their discontent."
- 11.8 In lieu of that Group, a Community Liaison Group met for the first time on 27 February 2003. Its functions were to include canvassing the views of the various stakeholder groups in the community and communicating information and responses. Its membership included representatives from local iwi, asthma and allergy organisations, the Plunket Society, business interests, Health Link, and the Waitakere Area Principals Association.
- 11.9 MAF was required to report to the Cabinet Economic Development Committee (EDC) by 30 June 2004 with an update and recommendations for future strategy.<sup>5</sup> This the Ministry did, reporting successful completion of the operation, but stating that monitoring would continue for a further two years.<sup>6</sup>
- 11.10 Spray operations continued, though on a diminishing scale, through to 13 May 2004, by which time some 40 operations had been carried out.<sup>7</sup>

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<sup>4</sup> Minister of Biosecurity's paper to EDC - 13.6.04 [**Doc 105AA/3**]

<sup>5</sup> EDC Min (03) 11/1 – 21.5.03 [**Doc 55**]

<sup>6</sup> EDC paper ( 04) 90 -25 .6.04 [**Doc 105AA/2**]

<sup>7</sup> See papers associated with [**Doc 23**]

## 12. Hamilton – Asian Gypsy Moth – September 2003

- 12.1 In September 2003 Cabinet directed MAF to conduct an aerial spray programme over part of Hamilton in response to a feared incursion of Asian Gypsy Moth. A single male moth had been trapped on 26 March 2003. No other evidence was found of a moth incursion. MAF, however, felt obliged to rely on its technical advice, and the aerial spraying of over 1253 ha was carried out, at a cost of something over \$7m. 23,598 people were believed to be living in the spray area.<sup>8</sup> The numbers of transients is not known. As in Auckland, section 7A of the Biosecurity Act was used so avoiding the need for consents under Part 3 of the Resource Management Act.
- 12.2 At paragraph 18 of the Minister of Biosecurity's paper to the Cabinet Economic Development Committee (EDC), probably dated 27 August 2003 (which formed the basis of what was to follow)<sup>9</sup>, it was said:

"Although no further moths or other life stages have been found, it is possible that a population does exist but is too small to detect or moth flight season has ended before the intensive trapping programme, which detects only adult male moths was deployed. Whilst there is a reasonable chance such a population would suffer natural extinction, there is also compelling evidence that this type of moth can become established in New Zealand from a single or small number of egg masses."

The potential economic impacts on a preliminary assessment in the absence of government intervention could total between \$5 million and \$400 million (present value in 2003) over 50 years with a medium impact scenario estimate of \$46 million, together with some unquantified losses in urban amenity values, impacts on indigenous species, riparian, erosion control and shelter planting, and human health.

- 12.3 MAF recommended pursuing eradication based on aerial spraying in spring 2003, followed by mass trapping. That was on the advice of its Technical Advisory Group.

The paper added:

"A 12 month delay would provide opportunity to AGM to complete an entire life cycle, increasing the population and the size of the infested area, thereby causing the cost of eradication to increase and almost certainly the technical feasibility and probability of success to be reduced. During such delay there would remain the risk of spread out of Hamilton on inanimate objects or vegetation. If no attempt is made to eradicate AGM this year, the prospect of successful control subsequently may be limited and eradication could become impossible ever to achieve."

- 12.4 Assuming that aerial spraying took place, it would comprise eight sprays with seven day intervals to allow delay due to unsuitable weather during October and November 2003.

<sup>8</sup> Overarching Report for MAF – July 2006 – [Doc 132B].

<sup>9</sup> [Doc 71] comprises the Minister's original paper, a further paper dated immediately prior to 3 September 2003 in response to the Committee's queries, the material leading to the making of an Order in Council under the Biosecurity (Resource Management Act Exemption) Regulations 2003, the Committee's Minute EDC Min. (03) 21/2 -3 of 3 September 2003, the MAF brief to the Minister dated 8 September 2003, and the Cabinet Minute CAB Min (03) 30/10 of 8 September 2003.

[Doc 105B] – MAF Report to Cabinet EDC – EDC (04)102 and Minute (04)14/4.

- 12.5 Evidently the EDC was not satisfied with the information in the original paper for they invited the Minister to provide a further report covering a quite wide range of matters. Crucially, in the further paper the Technical Advisory Group was stated as considering there to be a medium to high probability that a self-sustaining population of AGM existed in Hamilton. The probability that intensive surveillance would have detected such a population was considered to be low and the Group was of the unanimous opinion that the probability of natural extinction of such a population was also low. Likewise, the probability of further incursions of AGM.
- 12.6 Therefore, despite the fact that only 1 male moth had been found at any stage in the 10 years during which surveillance had taken place, there was considered to be a medium to high probability of a self-sustaining population of AGM existing in Hamilton.
- 12.7 The urgency came from the need for aerial spraying. If it was to be carried out in 2003, it had to begin in early October. The various other statutory steps which required had to be commenced by no later than 8 September. The paper admits that there was limited information available on which to base qualitative estimates of probabilities of establishment of AGM in New Zealand and its successful eradication.
- 12.8 I have recently been provided with copies of the relevant Minutes of the Asian Gypsy Moth Technical Advisory Group. The Group was largely comprised of MAF, or MAF associated, personnel, and it was not apparent from the Minutes that there was anyone who challenged the prevailing view that aerial spraying was necessary to eradicate the "incursion" - if the known presence of one male moth can be so described.
- 12.9 A list of reasons was put forward<sup>10</sup>, but all seemed to turn in the end on the proposition that, "The likelihood is that there is a population out there that we haven't located as yet". "Likelihood" usually equates to probability, or something that is more likely than not. On one tree one male moth had been located in the past 10 years of surveillance, and so far as I am aware, no more moths were found despite intensive search. That was the dilemma which faced the Director General and I do not question the judgement that was his to make.

### **High Court proceedings**

- 12.10 An application by some Hamilton residents was made to the High Court for orders to prevent the spray programme from proceeding, but this was unsuccessful.<sup>11</sup> In so far as the proceeding was founded upon section 10 of the New Zealand Bill of Rights Act it was unsuccessful on the basis of the evidence and submissions before the Court. However, the Court did not decide that such a claim can never be successful.

### **Health Act issues**

- 12.11 The Hamilton City Council had adopted the advice of its officials on 4 August 2003 that there was insufficient evidence (at that time) of a health nuisance.

<sup>10</sup> AGM TAG Minutes – 17 June 2003 – **[Doc MAF 8]**

<sup>11</sup> *Watch (Waikato Against Toxic and Chemical Hazards) Inc. v. Attorney General* – CIV 2003 – 419 -1265 - Hamilton Registry - Potter J. 29.10.03 **[Doc 87]**

However, on 29 September 2003 the Council received notice of motion to reconsider its stance. Having first obtained the advice of the Council's solicitors, it held an Extraordinary Meeting on 3 October 2003, at which the Council resolved to obtain an independent assessment. This it did from an Australian toxicologist, Dr Peter Di Marco.<sup>12</sup> Spraying having commenced on 8 October, his report was prepared in some haste between 16 and 30 October 2003. He appears to have understood his instructions as being to make a recommendation on whether or not a health nuisance existed which was "*injurious or offensive to health*".<sup>13</sup> He advised that it did not. It is not clear that Dr Di Marco had access to the full formula of Foray 48B at that time.

12.12 The issue, however, arose under section 23(c) of the Health Act 1956, which states:

**"23 General powers and duties of local authorities in respect of public health**

Subject to the provisions of this Act, it shall be the duty of every local authority to improve, promote, and protect public health within its district, and for that purpose every local authority is hereby empowered and directed -...

- (b) To cause inspection of its district to be regularly made for the purpose of ascertaining if any nuisances, or any conditions likely to be injurious to health or offensive, exist in the district;
- (c) If satisfied that any nuisance, or any condition likely to be injurious to health or offensive, exists in the district, to cause all proper steps to be taken to secure the abatement of the nuisance or the removal of the condition;..."

Section 7A of the Biosecurity Act is directed expressly to the avoidance of certain provisions of the Resource Management Act. It may be possible to read s.138 of the Health Act as defeating the duty imposed by s.23(c) of that Act, but that would seem to involve construing s.7A as authorising the creation of a "nuisance" or "any condition likely to be injurious to health" between which s.23(c) appears to differentiate. It may be that in the event of similar circumstances arising in the future, a local authority might have to look with some care at what has occurred in West Auckland and Hamilton before it concluded that spraying would not create a "condition likely to be injurious to health".

12.13 I have now seen the Minister for Biosecurity's paper to Cabinet EDC reporting on the Hamilton spray programme. It paints a somewhat more rosy picture than in my view an examination of some of the background material justifies. It fails to recognise the very real discomfort caused to staff at Fraser High School and the disruption to that School's activities, it refers to a small core of activists, but omits any reference to the 10,000 inhabitants who signed a petition to Parliament opposing the spray. MAF's general satisfaction with the health programme does not square with the quite detailed OSH report about the experiences of Fraser High School's staff in their dealings with MAF's Health Service.

12.14 From Table 2 below it appears that Hamilton residents received close to 37% more spray per hectare, and received it 2.5 times more quickly, than West Auckland residents at the height of the spray programme there.

<sup>12</sup> "*Report to Hamilton City Council... Foray 48B*" - Dr P. N. Di Marco -30.10.03 – [Doc 87A]

<sup>13</sup> As indicated below, that may not have been the right statutory question.

TABLE 2 – Hamilton/West Auckland spray comparison<sup>14</sup>

|                              | No. of spray days | Spray period                 | Spray intervals | Total litres | l/spray day | Spray area    | l/ha |
|------------------------------|-------------------|------------------------------|-----------------|--------------|-------------|---------------|------|
| Hamilton (West and Frankton) | 8                 | 52 dd.<br>(Oct/Nov.2003)     | 6.5dd. app      | 65,300       | 8,162       | 1,253 ha      | 6.51 |
| Auckland West                | 8                 | 130 dd.<br>(Nov.02/April 03) | 16 dd. ave.     | 373,000 app. | 46,625 app. | 9,800 ha. app | 4.75 |

The residents of parts of Hamilton appear to have received almost twice as much spray during their 52 day spray period than West Aucklanders received. No reference to this possibility appears in any of the papers I have seen. Certainly it is not mentioned in the Ministry's publication to Hamilton householders *"Information about Gypsy Moth in Hamilton"*<sup>15</sup>. Whether it explains the severity of the outbreak of sickness at Fraser High School I am unable to say. The medical advice is that the symptoms were caused by food allergies, but these emanated from the spray. A lesser amount of spraying may, conceivably, have avoided or reduce the symptoms.

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<sup>14</sup> Prepared in my Office.

<sup>15</sup> [Doc 75]

### 13. Effects on inhabitants of spray operations

#### Operation Ever Green - Auckland Eastern suburbs (1996/97)

- 13.1 The first of these, Operation Ever Green, has been described in some detail above. It was carried out during the period October 1996 to April 1997, and was the subject of a Health Surveillance Report published in May 2001.<sup>1</sup> In summary, it involved the use of a DC 6 four-engined aircraft flying nine missions, of approximately three hours each, during the morning, in the period 5 October to 9 December 1996. The coverage varied from 1000 to 4000 hectares. That was supplemented by helicopter operations in limited areas, some uninhabited, with coverage varying between 140 and 308 hectares, through to April 1997. Over 158,000 litres of insecticide was applied in quantities which ranged from 700 litres to 21,000 litres on various days. The population totalled over 86,000 people. Of them, some 375 people reported a variety of symptoms, all of which fell within the parameters anticipated in the relevant HRA.<sup>2</sup>
- 13.2 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,<sup>3</sup> 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".
- 13.3 Fuller details of the Survey are given above,<sup>4</sup> but its conclusions were:

"A comprehensive health surveillance programme has examined health outcomes for a period of two years [after the conclusion of aerial spraying] -using individual, local, regional and national health information. This included investigating residents' self-reported health concerns, consultation rates at sentinel family doctors, and a review of health data sources to establish birth outcomes and other events of community concern.

"No adverse health patterns were found, once patterns were examined at a population level.<sup>5</sup> The frequency of occurrence of the following was no different from natural variation: early births; small babies; birth defects; consultation rates with sentinel family doctors for asthma, other respiratory problems, headaches, skin or eye symptoms, and autoimmune disorders.

"There was a pattern of self-reporting by residents to MAF for irritant respiratory, skin and eye symptoms at the time of spraying and a level of expressed concern about potential future disease. A voluntary register of residents exposed to the longer duration programme was well supported and has been placed in the National Archives (Auckland Regional Office) to assist with any future health studies."

<sup>1</sup> "Health Surveillance Following Operation Ever Green" – Aer'aqua Medicine Ltd - May 2001 [Doc 11]

<sup>2</sup> Health Risk Assessment - White Spotted Tussock Moth - 4.9.96 - Auckland Healthcare and Jenner Consultants. [Doc 4A]

<sup>3</sup> Cf. Painted Apple Moth Campaign Communications – Research Report – p.7 [102DD/1]

<sup>4</sup> Paras.5.1 – 5.11.

<sup>5</sup> For my comment on this statement see para.7.7 above.



- 13.4 The Report has much detailed information and was peer reviewed by a team of medical specialists. It concludes that while some irritating symptoms were displayed and reported by 375 people, out of over 86,000 in the spray area, these were relatively mild passing problems exhibiting no evidence of continuing illness. MAF therefore felt able to use these conclusions for claiming safety for its future spray operations.

### **Painted Apple Moth - Western Auckland (1999/2003)**

- 13.5 The details of the PAM spray programme are discussed at length above.<sup>6</sup> It grew from a comparatively modest programme to one potentially affecting 193,188 inhabitants of West Auckland, and parts of Hobsonville, together with transients.<sup>7</sup> Some 840 people received clinical assessments, a 100 of whom were referred on for specialist consultations. While those numbers are a small fraction of those potentially capable of being affected, the measure of the disturbance caused to the community may be judged by the 22,263 calls fielded by the PAM Health Service (provided by MAF) during the period 30 December 2001 to 4 July 2004.<sup>8</sup>

### **Spray population surveys (MAF funded)**

- 13.6 During the period August 2001 – July 2006, 14 surveys of various kinds were carried out at the instance of MAF. I have detailed records of 5 comparable surveys conducted by Venture Research Ltd, of Auckland, to test the extent to which the information being put out by the Ministry regarding the need for the sprays, and also the spray process, was being received by the public in the sprayed areas. The following table shows some details.

**Table 3 – West Auckland surveys**

| <b>Survey No. and date</b>      | <b>Most proximate spray date</b>                  | <b>Areas sprayed</b> | <b>Litres of the spray</b> |
|---------------------------------|---|----------------------|----------------------------|
| 1. 19 - 26.11.2002 <sup>9</sup> | Immediately following sprays 10 and 11            | 8000 ha              | 40,000                     |
| 2. 4 - 17.4.2003 <sup>10</sup>  | Following spray 18                                | 9000 ha              | 45,000                     |
| 3. 29.7 – 15.8.03 <sup>11</sup> | Spray 23: 4.8.03                                  | 929 ha               | 5,800                      |
| 4. 1 - 14.12.2003 <sup>12</sup> | During sprays is 28 and 29                        | 1000 ha              | 5,100                      |
| 5. April 2004 <sup>13</sup>     | A few weeks before the final spray on 13 May 2004 | 254 ha               | 1,400                      |

- 13.7 All were telephone surveys of 300 - 567 adults randomly sampled. They showed that there was general support for the spray operation, but that while damage to the horticultural industry and native trees and bush was regarded as being more significant, there remained some 20% or more, who disagreed with the programme. On a graph in the fifth survey, which was intended to indicate whether those surveyed thought that, "all things considered MAF was doing a good job in eradicating PAM while taking into account

<sup>6</sup> Parts 9 – 11 above

<sup>7</sup> Health Surveillance, 2005 – para.2.6, p.33.

<sup>8</sup> Ibid– para.3.1, p.35.

<sup>9</sup> [Doc 28]

<sup>10</sup> [Doc's 50 and 50A]

<sup>11</sup> Supplied by MAF

<sup>12</sup> [Doc 94A]

<sup>13</sup> [Doc 99A]. A further survey dated July 2006 has not been located.

the concerns of the residents", over the total area 60% were of that view, 16% were neutral, and approximately 23% disagreed, but in the five "high risk areas" the comparable percentages were shown as 51%, 22%, and 27%.

- 13.8 Use of such percentages as an indicative measure can tend to disguise the reality. In part of its response to paragraph 13.10 of my draft Report, MAF states, "Survey results responding to the statement, *'the eradication programme is inconvenient, but ultimately worth it to stop the environmental damage and health effects the moth could cause'* showed that 67% of respondents agreed with the statement, 20% neither agreed or disagreed and only 13% disagreed".
- 13.9 Of course, 67% shows a high level of support, but the references to 20% and 13% represent, respectively, 38,600 people who, for whatever reason, chose not to express an opinion, and 25,000 people who remained opposed. One may compare those figures with the extrapolation from the specially selected survey mentioned below.<sup>14</sup> I question whether MAF (or the Government of the day) should take comfort in face of that residual level of concern.
- 13.10 I have a copy of the questionnaire<sup>15</sup> used for survey 4. Judging from the survey outcomes it is likely that a similar questionnaire was used in the earlier surveys. The survey seemingly provides no opportunity for comment on the reactions caused by the spray. However, the report of survey 2 does contain a category, "Recall any ads or information about the small number of people who experience health problems as a result of the PAM spray programme...". 79% of those questioned did recall such information.
- 13.11 In addition to the questionnaire, I have a further Venture Research document entitled "*Painted Apple Moth Resident Perceptions - Research Report*" (February 2004).<sup>16</sup> It contains four possible scenarios for the new spray operations proposed for February 2004. Under the heading "*Research Methods*" (p.3), the report states:

"We conducted in-depth telephone interviews with 20 "average" residents in the five summer areas - 4 residents from each area...

The interviews were carried out in the week commencing 2 February 2004...

These residents were recruited and screened to ensure they are not part of any pressure groups focused on the eradication campaign. This was done to ensure the views identified by research were representative of the vast majority of residents - not the "fringe" pressure groups."

Some of the comments from this carefully selected group are instructive:

*"I don't want to even think we've gone through all this grief for nothing."*

*"We've made such a big sacrifice over the last few years, we should finish the job properly and make sure moth never gets a foothold in New Zealand again."*

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<sup>14</sup> Para.13.11 below

<sup>15</sup> [Doc 50A]

<sup>16</sup> [Doc 102DD]

The interviewers record:

"A few interviewees (2 out of 20) challenge the validity of the programme - saying that aerial spraying suited vested interests (e.g. the spray and aircraft service providers) and other eradication methods should have been utilised. They believe the spray is causing adverse health effects for residents-and that aerial spraying is an unnecessarily risky way to eradicate the pest."

13.12 On page 6, under the heading "**Residents Still Have Health Concerns (Albeit Fewer Than Before)**", the interviewers wrote:

"When the spray programme started some interviewees were quite concerned about the effects of the spray on themselves and their family . These concerns were fuelled by rumours that the spray containing toxic chemicals and by protest group assertions that were covered in the media.

"Over time, these health concerns have reduced due to two factors:

- MAF has been very open about the contents of the spray and how it works only on caterpillars. It has consistently promised the spray will have no long-term or significant effects on humans or pets. MAF has reassured them with its mentions of studies that prove the safety of the spray in other countries (including the US, which is very cautious about health risks).
- Thousands of residents have been exposed to the spray many times for 3 - 5 years now - with no significant health effects being noticed by the interviewees or reported in the media (aside from short-term allergies or breathing conditions being exacerbated for a few people). If the spray were going to have significant short-term effects, they would have been heard about by now and reported in the media.

"However, there is one last concern held by some interviewees (5 out of 20). They worry the spray may have small (but significant) long-term impacts on residents health - because of the large number of times Auckland people have been exposed to the spray.

"These people worry about the length of time the spray has been used in Auckland (especially over the heavily infested areas). They say this is a type of exposure not been experienced before - and is therefore not covered by the health studies MAF has seen.

"They wonder if the spray is still safe in the circumstances - and if the public may experience health problems in 10 to 20 years because of this high-frequency contact.

"They say these long-term health effects tend to be invisible at the time of the exposure to the chemicals - but then manifest in diseases like cancer, blood disorders, and breathing problems later in life.

"These people would like to hear about any studies which indicate these long-term health problems will not occur due to the high-frequency spraying they have experienced in Auckland."

13.13 It is not without interest that from this group, chosen especially to be "representative of the vast majority of residents – not the "fringe" pressure groups", there were 10% who expressed deep concerns about the spraying itself, and 25% who had continuing concerns about the possibility of long-term injury to their health. If one may extrapolate those percentages across the sprayed population (which was finally numbered

at over 193,000), one has in the first case some 19,000 people, and in the other, close to 48,000 people with concerns which mirror those expressed by the overt opponents of the spray programme.

- 13.14 MAF has questioned the robustness of these statistics and I accept that too much weight cannot be placed upon them; yet the record of the concerns of this specially chosen group are as cited above, and they cast doubt on such statements as,

"The vast majority of people will not be affected by the spray, however a tiny number of people who have significant food allergies or severe asthma should feel free to call the Painted Apple Moth Health Service..."<sup>17</sup> (my emphasis)

- 13.15 However, amongst the material recently provided to me by MAF is what was evidently a multipage publication entitled "*Painted Apple Moth What's at Stake?*"<sup>18</sup> - apparently published in the winter of 2003. It was sponsored by MAF, but I note a disclaimer from Allergy New Zealand<sup>19</sup>. At pages 25 and 28 there is reference to the concerns of Dr Rohan Ameratunga, an Auckland allergy specialist, about the danger of people becoming sensitised (ie. becoming allergic to) ingredients in Foray 48B. At page 25 he is recorded as saying that the only way to allay people's fears on this issue is to undertake properly conducted studies. His views are stated more fully at page 28, where Dr Kelly indicates that some progress has been made towards that, but I have not been directed to it.

- 13.16 In my draft Report I said,

"The surveys also disclosed quite a strong concern at the inadequacy of the information about when spraying would be taking place. It would seem to follow that if people were strongly concerned about that, it would only be because they expected some significant inconvenience of some kind from the operation, and wished to take steps to avoid being sprayed."

- 13.17 With reference to that paragraph, MAF has provided me with three volumes of material much of which I had not previously seen, and has summarised its communications initiatives. In the light of this new information, I accept that considerable efforts were made to inform the community. However, I stand by my original statement, and take some support from pages 30-32 of the publication "*Painted Apple Moth What's at Stake?*"<sup>20</sup> I have been provided with copies of the "*Target Day your next Aerial Operation*" notices for the 24 sprays scheduled for the period 28 January 2003 to 11 May 2004.<sup>21</sup> By comparison with my other records<sup>22</sup>, it appears that 16 of those dates were altered, some by only one day but others by longer periods. I appreciate of course that these changes were probably dictated by weather conditions, but they nevertheless represent a significant degree of uncertainty for those dependent on such information.

<sup>17</sup> Painted Apple Moth Operational Communications Report – Vol.2 - "Wipe out Painted Apple Moth" - 27 December 2002 - **[Doc 67AA]**

<sup>18</sup> **[Doc 67AA]**

<sup>19</sup> **[Doc 136]** – website material.

<sup>20</sup> **[Doc 67AA]**

<sup>21</sup> MAF 13.05-13.10 Vol.1

<sup>22</sup> **[Doc 23]**

### **Spray population surveys - privately funded**

- 13.18 In between Venture Research surveys 1 and 2, a survey was carried out, during February 2003, by the New Zealand Education Institute, West Auckland.<sup>23</sup> That was prompted by concerns expressed by primary sector teaching staff. Two questions were addressed to the general staff, and four questions were addressed to principals. 320 general staff responded and 33 principals also replied. Some of course were more affected than others, but some 56% replied that they had received adverse effects from the spray and had noted similar effects amongst the children. There was particular concern about the disruption caused on spray days when it was necessary to keep the children inside with windows closed on very hot days.
- 13.19 The low-flying aircraft also created anxiety amongst the children. While staff absenteeism was quite limited, 66% of the principals recorded an increase in pupil absenteeism on spray days. The reactions noticed amongst teaching staff included breathing difficulties, or asthma related problems, eczema, and watery eyes. In some cases the symptoms lasted days and in some instances even weeks, and recurred on subsequent spray days.<sup>24</sup> These symptoms, common to others affected by the spray, could be expected to be particularly disturbing to those attempting to teach schoolchildren.
- 13.20 The Institute called on both central and local government authorities to stop the spray. So far as I am aware, there was no response.

### **West Auckland Reports**

- 13.21 Two helpful<sup>25</sup> reports on the impact of the spray on the inhabitants were prepared at the instance of one or more of the groups formed to combat the spray programme. One, the Blackmore Report, was essentially an information gathering report which sought to bring together the various complaints of those affected. The other, the Watts Report,<sup>26</sup> was able to draw on the information which Ms Blackmore had brought together, and was directed to what the writer regarded as the unreliable features of the Health Risk Assessments which MAF obtained and relied on.

### **Blackmore Report**

- 13.22 Ms Blackmore reported that by the end of the year 2002, 315 people had complained of some 1397 symptoms, or outcomes, from the spraying up to that point. They are set out in some detail in the Report. It is noteworthy that they coincided quite closely with the types of symptoms which were recorded in relation to Operation Ever Green. They were to feature again in the survey carried out after completion of the PAM spray programme, and with the experience in Hamilton.

<sup>23</sup> NZEI West Auckland Aerial Spraying Survey – [Doc 44]

<sup>24</sup> Cf. The Hamilton Fraser High School experience – paras. 13.38 et seq.

<sup>25</sup> "Helpful" in the sense of clearly presenting the opposing view; not that it is a view to which greater weight is necessarily to be attached.

<sup>26</sup> *"Painted Apple Moth Eradication Programme - Health Risk and Effects"* – January 2003 - Dr Meriel Watts PhD (Akd), B.Agr. Sc (Massey) – [Doc 38]

13.23 The report was favourably peer reviewed for Ministry of Health by Dr David Phillips, Public Health Medicine Specialist, IESR<sup>27</sup>. The Institute had been asked to appraise and comment on the methodology of the report, to comment on the implications of the report for the public health, and to recommend what further work, if any, should be undertaken in relation to the report.

13.24 Of the report itself Dr Phillips said:

"The report is clear, concise and the reasoning is sound. It displays no obvious significant methodological or other flaws which might suggest that the observations and subsequent findings lacked veracity or credibility. Importantly, it explicitly recognizes the limitations of the report's approach in terms of attribution of exposure and health effects."

13.25 Dr Phillips commented at some length on the findings of Ms Blackmore's report and noted an array of human health effects, many of the reported respiratory, neurological, eye and skin symptoms being consistent with existing medical and lay understandings of a possible immediate physiological response to an irritant aerosol spray, though he also recognized that further information was required in respect of a number of the cases noted. He recorded the particular concern in relation to vulnerable family members especially spraying of children at school, and the implications of the spray programme on attendance, performance at examinations, and the impacts this might have on future opportunities in life. He noted too the problems of exposure assessment, the apparent absence of predictive modelling, and contingency planning for possible adverse effects. He said:

"Spraying frequency, coverage, intensity and duration has clearly expanded significantly beyond that initially anticipated. It has occurred over a far greater area, with a far larger population exposed. This has potential public health consequences. Exposure of some in a high intensity spray zones may have been far higher than initially estimated. Unintentional overlap compounding exposure in some areas."

13.26 Dr Phillips made a series of recommendations which he prefaced with the statement,

"Whatever the outcome of further investigations, action is urgently needed to ameliorate the current level of disquiet and distrust, if this is not to become a chronic problem."

13.27 The Blackmore Report accompanied the Ministry of Health's Health Report to its Minister of 14 April 2003, and went also to the Prime Minister.<sup>28</sup>

13.28 In the briefing paper to the Minister, the Deputy Director General, Public Health, appears to have adopted Dr Phillips's report<sup>29</sup>, and noted,

"Health officials consider further work is required as a result of the Blackmore report and have asked ESR scientists to consider developing methodology to

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<sup>27</sup> [Doc 48A]

<sup>28</sup> [Doc 48]

<sup>29</sup> This phrase has been criticised by the Ministry of Health, but on re-consideration of the Report to the Minister, I see no reason to change it.

analyse the data held by the PAM health service and Auckland DHB and report on the public health implications, in particular, advising whether the data supports the findings of the Blackmore report.<sup>30</sup> We have also asked ESR to consolidate and analyse the data and advise whether the health effects reported are consistent with the Health Risk Assessment, the report of the health surveillance programme following the white spotted tussock moth, and overseas experiences with spray programmes using Foray 48B and Btk.

"The proposed work is additional to the collection and analysis of health concerns relating to the aerial spraying programme that is being undertaken by the Wellington School of Medicine for the Ministry of Health.

"The projects being undertaken by ESR and Wellington Medical School researchers are related and health officials will ensure that the findings of each project contribute to the other."

13.29 The Minister appears to have accepted the Ministry's recommendations other than the offer of further written advice.<sup>31</sup> Within its scope, the Blackmore Report was evidently regarded as authoritative, and I do not consider that the comments in the Frampton report significantly detract from that position.<sup>32</sup> From that report, recently made available to me by the Ministries, I note that it now appears to be accepted that,

"Several important studies on the human health effects of Btk... have indicated that it is unlikely that exposure to Btk causes disease. However, several studies have shown that a range of symptoms can occur after exposure to Btk aerial applications. These include neuropsychiatric problems such as anxiety, dizziness, sleep problems and difficulty concentrating, and physical symptoms such as irritation of the throat, nose, eyes and skin, headaches, chest tightness, flu-like symptoms, stomach discomfort and diarrhoea."<sup>33</sup>

- all of them symptoms which have been reported in the three sprays referred to in this Report.

### **Dr Watts's Report**

13.30 In considering Dr Watts's Report I have particularly to remind myself that expert witnesses, if they assume the role of advocate, run the risk of losing their objectivity. Nevertheless, I find this report helpful because it tends to confirm from a scientific basis tentative conclusions which I had been inclined to reach on the basis of the information otherwise available to me.

13.31 With reference to the Health Surveillance Report following Operation Ever Green, Dr. Watts refers to the 375 people who reported symptoms and notes that the Health Surveillance Report concluded: "no adverse health patterns were found, once patterns were examined at a population level", and "amongst those medically reviewed, no individual was identified as having a significant adverse outcome attributable to the Btk spray". She adds,

<sup>30</sup> I have been informed by the Ministry that the further report from ESR was not obtained, as its proposed study was subsumed in the WMS researches.

<sup>31</sup> [Doc 48], of 16.4.03

<sup>32</sup> "Environmental and Health Impacts of Aerially-Applied Btk-based insecticides"-Frampton and others-June 2006 – p.44 [Doc MAF 3]

<sup>33</sup> 32 Ibid – p5 [Doc MAF 3]

"Notice that a lack of evidence of a causal association is not evidence that there is no link. It is not proof that the effects did not occur as a result of the spray. In this succession of reports, involving some of the same authors, there is a discernible tendency to confirm previous findings, rather than question them in the face of contradictory community reports."

"The Aer'Aqua report did not state the possible or probable cause of the symptoms, reported by 375 people, that appeared to be contemporaneous with the spraying. In other words, the report has interpreted an absence of a "*medical event*" at a population level, together with no proof of a link between Foray 48B spray and a "*significant adverse outcome*" for an individual as "*no significant diseases attributable to the spray*". This should not be reinterpreted to mean that the symptoms experienced by the 375 people were not caused by the spray. That is not proven by this health surveillance. The only interpretation that should be placed on the report is that there is no proven link." (pp.5/6).

13.32 Dr Watts refers to the 2002 Health Risk Assessment and criticises the view which, rightly or wrongly, she took to be held by MAF and Auckland Healthcare, that the extent and duration of exposure to the spray were of no consequence. She sets out to show that failure to adequately characterise exposure is a significant problem. This is a view seemingly shared by Dr. Rohan Ameratunga,<sup>34</sup> and by the authors of the WMS Report, as noted below.

13.33 Dr Watts criticises the inattention to neurological effects, and comments that while people do not as a rule go to doctors for headache remedies, some 64 people did report problems with headaches during Operation Ever Green, a pattern repeated in West Auckland. She notes too the, in her opinion, too ready acceptance of the non-risk of gastrointestinal effects. (pp.9/10)

13.34 Dr Watts sees the question of exposure to the spray as being of particular significance. She says:

"The exposure assessment for the PAM operation is premised on exposure during a short period of time, during or after the spray application. Experience in West Auckland has been that some people may be exposed directly to the spray up to five times in one day - in addition to the residual spray in their homes and workplaces... Thus the exposure assessment in this report appears to significantly underestimate the actual exposure people are experiencing, and hence the conclusions it reaches cannot be supported." (p.15)

13.35 The question of how contact with the spray takes place is also of considerable importance. It appears that dermal contact was assumed to be the primary route of exposure for residents outside, with inhalation as a possible alternative, but Dr Watts considers that expectation may have led to an underestimation of the exposure via inhalation (a view shared by the authors of the WMS Report)<sup>35</sup>, which would be inevitable if present in the spray zone during aerial spray, and has led to the conclusion in the report that,

<sup>34</sup> [Doc 67AA] – para.13.15 above

<sup>35</sup> [Doc 96] – p.44



"the exposures that could result from the use of the spray would not give rise to a sufficient intake into the human body to produce any of the symptoms flatulence; abdominal pain; or diarrhoea",

is unsupported by any evidence of mathematical modelling and cannot be substantiated in the light of the limited data available and of the assumption that people would only be exposed directly once to the spray per spray event. (pp.15/16)

13.36 With reference to the chemical components of Foray 48B she refers particularly to the question of the inclusion of benzoic acid and methyl paraben.

13.37 The effects of mixtures of chemicals have also to be considered. Dr Watts states:

"Standard toxicological tests are carried out on single chemicals, even though toxicological texts all acknowledged the potential effects of mixtures of chemicals.

"Risk assessment assumes that a person is exposed to only one chemical at a time, which is obviously not what happens with the application of a mixture of chemicals like Foray 48B. But there have been several studies recently that demonstrate the synergistic effects of chemicals, particularly on neurological, endocrine, immune or developmental functions, which are especially sensitive,..."(p.19)

13.38 Dr Watts asserts that there is a systematic discounting of reported effects of Btk and Foray 48B exposure throughout the reports. She points out that where data is lacking the assumption is made that the effect will be absent. She also refers to the assertion made that the risk is small, but this cannot be justified on a scientific basis.

"The assessment should say that because data on long-term exposure is lacking, the risks from long-term exposure cannot be ascertained. Instead it concludes the risks are small. It seriously underestimates exposure.

"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 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 such a situation the cumulative weight of experience should be taken into account. If there are repeated incidents of reported symptoms that cannot be causally linked or regarded as statistically significant in each instance, then a weight of evidence approach should be used. Whilst that weight of evidence could be said to have not existed within New Zealand before Operation Ever Green... that is no longer the case after the experience with the PAM programme to date." (p.21)

13.39 Dr Watts records that the Auckland District Health Board's Public Health Protection Office in a Fact Sheet issued in relation to the spray on 21 December 2001 stated:

"Some components of the spray have been noted to cause skin irritation and allergy when used in pharmaceutical and cosmetic products and foods, 'the level of exposure expected from the spray programme is not expected to cause these effects though people may attributed them to the spray' ".

"No significant health effects are expected from the spray programme."

13.40 Dr Watts points out that despite those assertions, the community at that time was still reporting adverse health effects that looked remarkably similar to the hazards identified in the Health Risk Assessment as being inherent to the components of the mixture of substances that is called Foray 48B. The similarities of the symptoms shown in Tables 1, 2 and 3 of the Report may justify acknowledging the validity of the community experience.

13.41 Dr Deborah Read prepared a brief report on Dr Watts's report<sup>36</sup> but she was unable to assess the full implications of that report because it appears that she did not have access to the Health Risk Assessment on which Dr Watts was largely commenting. Nevertheless, Dr Read was able to conclude her report by stating:

"In conclusion the author raises valid concerns in particular recognition of the legitimacy of community experience in the face of conflicting previous conclusions. This is not the same as accepting the experience as being caused by the spraying but rather acknowledging the possibility. The concerns are reasonable and highlight different perspectives in particular that a small population risk is not small on an individual or highly susceptible subpopulation base and a preference among some for a more precautionary approach in the face of incomplete scientific knowledge.

"The original exposure assessment may also be insufficient. This is difficult to determine in the absence of information as to the size of the population that are being exposed more frequently and for longer duration than was estimated in the HRA. Though not the main source of exposure residual exposure from surfaces should also be considered."

13.42 Dr Read, however, referred to an issue raised earlier in this Report<sup>37</sup>, namely the differences in perception between population versus individual/highly susceptible subpopulation perspectives. She observes,

"Effects that are insignificant, negligible or acceptable on a population basis in terms of both numbers of people affected and the magnitude of adverse health outcomes will not be to the subgroup of people that are experiencing them. In this regard it is often preferable to refer to tolerable risk which recognizes that though the risk may not be acceptable to some it may be tolerable (though not to all) for other reasons such as the benefits from use of the substance."<sup>38</sup>

13.43 My draft Report is criticised by the Ministries because they say it gives undue scope (and, by inference, undue weight) to Dr Watts's report. I have paid heed to the reports of the Ministries' experts. However, in weighing up both sides of these issues, and especially that of possible long-term effects, I recall that assurances have been given before, for example about 245T, which unfortunately, some years later, proved to have been ill-founded. I

<sup>36</sup> "Review of Watts M. Painted Apple moth eradication programme: health risks and effects (2003)" - Dr Deborah Read, public medicine specialist – April 2003 [Doc 51]

<sup>37</sup> Para.7.7

<sup>38</sup> [Doc 51]

note that the Wellington Medical School Report states that the then existing (February 2004) community surveys were unable to prove that *Bt* products cause no important health impacts in exposed communities.<sup>39</sup> Yet at one point, it may have been in July 2003, MAF put out an information sheet headed "People are asking is there any evidence of long-term health effects resulting from the spray? The answer is no."<sup>40</sup> The information contained in the notice fails to address the rather obvious answer to the question posed, namely that no real investigation of the question had at that time been carried out. I have not been referred to any more recent material on long-term health effects resulting from the spray.

- 13.44 In the response of the Ministries to my draft Report it is said that I have quoted the reviewers out of context, have given inappropriate weighting to parts of their reviews, and have ignored the criticisms that they had made. In the absence of any supporting detail, I do not accept that to be so. I note that the latest independent study of the literature has little criticism of either the Blackmore or Watts Reports.<sup>41</sup>

### **Petrie (2003) Report**

- 13.45 In addition to this community-based work, specialists from the Faculty of Medical and Health Sciences in the University of Auckland carried out a limited investigation into the effects of aerial spraying with Foray 48B, the Petrie *et al* Report<sup>42</sup>. Though the Report suffers from the disadvantage that the data was gathered some months before the major sprays took place from October 2002 onwards, their findings are not inconsistent with those anticipated in the HRA, and confirmed in detail in the Blackmore Report.
- 13.46 The conclusions recorded in the Abstract to the Petrie Report (2003)<sup>43</sup> state:

"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."

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.

- 13.47 Since the issue of my Draft Report the Ministries had brought to my attention the existence of a number of other reports. I shall refer to some of them later in this report.

<sup>39</sup> [Doc 96] p.49

<sup>40</sup> MAF 13.05 – 13.10 Vol.1

<sup>41</sup> "Environmental and Health Impacts of Aerially-Applied *Btk*-based insecticides" - Frampton and others - June 2006 – p.44 [Doc MAF 3]

<sup>42</sup> [Doc 46]

<sup>43</sup> The Petrie (2003) paper was republished by a different group of authors in 2005 - *Psychosomatic Medicine* 67: 778 782.

### Ms Sally Lewis – Diary

- 13.48 In addition to these professional studies, I have been provided with a copy of the diary of Ms Sally Lewis who, at the relevant time, lived in Riverview Road in the West Auckland suburb of Kelston.
- 13.49 Judging by the information on the maps provided to me of the various areas sprayed it seems likely that Kelston would have been sprayed, wholly or partially, on most occasions. Ms Lewis appears to have had a number of significant health problems which may have been created, or exacerbated, by exposure to the spray. In her diary, which she maintained more or less day to day from 15 January 2002 through 12 October 2003, she reports the considerable impact which the spray operations appear to have had upon her.
- 13.50 For present purposes, however, it is significant that on 23 October 2002 Ms Lewis was told that spraying had taken place over her house by helicopter and by plane on five occasions during the course of a spray operation which apparently lasted from 6:30 a.m. through to 5:45 pm. Again on 3 December 2002 her house was said to have been sprayed over 10 times in the course of the operations on that day. On 17 February 2003 spraying had been carried out over her house seven times in the past two days. In all she calculated that during the course of the spray operations through to 30 September 2003 the house was in the spray path 53 times.<sup>44</sup>
- 13.51 The issue of spray drift is said in the Frampton and others Report<sup>45</sup> to be "the biggest issue with application of Btk, especially from the air...". One of the studies recorded there found toxicity from foliage collected up to 3 km from the spray zone.
- 13.52 Another 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.<sup>46</sup>
- 13.53 Of course, wind strengths, and perhaps other climatic conditions might have an influence, but it seems clear that absolute precision is unlikely to be achieved and that it is unsafe to assume outdoor concentrations may not linger, and that there may not be significant spray drift.
- 13.54 I am not, of course, suggesting that Ms Lewis's house was specially targeted, but these reports appear to me to support the concerns expressed by Dr Watts in relation to the cumulative effect of spraying, and they give a quite different picture from that painted in the official accounts of what was intended to occur.

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<sup>44</sup> Hearsay evidence may not be wholly reliable, but there is no serious inconsistency between Ms Lewis's version (which is confirmed by her statutory declaration) and what is shown in the aerial maps most recently provided to me.

<sup>45</sup> "*Environmental and Health Impacts of aerially -applied Btk - based insecticides*" - Frampton and others - June 2006 p.18 [Doc MAF 3]

<sup>46</sup> Ibid p.36.

13.55 MAF has advised me that Dr Francesca Kelly has stated:

"Ms Lewis has had thorough and repetitive medical assessments, by medical specialists, who could not give any credence to her claims of spray related health effects".

As that information did not coincide with the medical certificates provided to me by Ms Lewis as exhibits to her statutory declaration, I caused further enquiries to be made. I understand that Ms Lewis has not received further private specialist advice but has been treated within the public hospital system. However, the medical reports which I have seen covering the period 7 March 2002 to 26 August 2003 did give credence to the existence of spray related health effects.

### **Asian gypsy moth – Hamilton (2003)**

13.56 It is necessary now to advert to the problems which arose at Hamilton (and recounted below), where aerial spraying commenced on 8 October 2003. The executive steps taken have already been considered<sup>47</sup>.

13.57 The Minister of Biosecurity's paper to the Cabinet Economic Development Committee<sup>48</sup>, dealt with in Part 12 above, placed reliance on the Health Risk Assessment made earlier in Auckland and brought up-to-date in March 2002, but it was added that a new health risk assessment was then in development. In the initial paper another reference was also made to the Health Risk Assessment undertaken by the Auckland District Health Board prior to the PAM eradication programme. It was added that similar health support would be provided in relation to Hamilton building on experience gained in the PAM eradication programme, but adapted to the needs of local community, and in consultation with the Waikato District Health Board and the Ministry of Health. Also it was stated that, despite health support and monitoring included in the proposed programme, there was a low risk of spray causing health impacts to susceptible individuals. An allowance of \$1.5 million was provided for health expenditure in the 2003/04 year.

13.58 The new Health Risk Assessment<sup>49</sup>, to which the Minister referred, became available on 10 October 2003, just after the spray operations had begun at Hamilton. It relied heavily on the reports then in existence in relation to Auckland and upon the data available from the PAM Health Service.

13.59 In an interview with Ministry of Health staff in November 2003<sup>50</sup> my Office was informed that this HRA was initiated by MAF at a meeting a few months earlier (probably that held on 2 July 2003)<sup>51</sup>, and paid for out of MAF's vote for the spray programme. It was seen as a Ministry of Health project in liaison with the Auckland Regional Public Health Service, by which it was prepared. The HRA was peer reviewed by a number of suitably qualified persons.

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<sup>47</sup> See Part 12 above.

<sup>48</sup> [Doc 71] (Pt.1)

<sup>49</sup> "Human Health considerations. in Hamilton" - October 2003 - Auckland Regional Public Health Service. – [Doc 74]

<sup>50</sup> [Doc 90]

<sup>51</sup> [Doc 64]

- 13.60 From that meeting it appears that the formulation of Foray 48B was available to the Ministry but not the additional information needed for the purposes of registration through ERMA. The view expressed at the meeting was that the concentrations of possibly toxic substances in the spray were significantly less than those likely to be found in the relevant cosmetic preparations, because they are usually applied in quantity to the body, whereas the spray is unlikely in the ordinary case to come into contact extensively. The issue of inhalation was not alluded to.
- 13.61 No actual study has been done on the level of exposure. It was suggested that the very low levels would make such a study impractical. The Blackmore and other similar reports were not mentioned in the HRA since, apparently, they identified nothing unexpected.
- 13.62 It was explained that the statement<sup>52</sup> which was repeated at page 27 of the Assessment from earlier such documents, "no adverse health patterns were found, once patterns were examined at a population level", was not intended to play down possible danger to individuals, but refers to long-term effects or late exhibition of symptoms, that is to say long-term effects above background levels. It was not intended to be taken as a commentary on transient effects, which is how most of the reported symptoms may be regarded.<sup>53</sup>
- 13.63 The comparison above to the use of cosmetics seems questionable because the pattern of use is known to the manufacturer and one would expect that every effort would be made not to harm the end-user. By contrast, in the spray operation, the objective is to kill the moth and to give full value for money for the application of the spray. It would seem possible that there could be limited inducement to use minimum amounts - over spraying could be regarded as acceptable, especially in the absence of actual studies on safe exposure levels.
- 13.64 The only detailed information I have relating to events at Hamilton centre around the impact on Hamilton's Fraser High School, of which Mr Martin Elliott was then the Principal. Mr Elliott used to write a column for the *Waikato Times*, and shortly before the spray programme was to commence he expressed the view that while he had no greater desire than anyone else to be sprayed, it seemed unlikely that anyone would be significantly affected, but to the extent that they were, MAF would treat their case with compassion.
- 13.65 However, in his letter to the *Waikato Times* of 4 November 2003<sup>54</sup> he vigorously recanted of both those views after the experience of the effect of the spray on staff and some of the students, and of the, in his judgement, unsatisfactory manner in which his staff had been treated by the medical team engaged by MAF.
- 13.66 The School had 160 - 180 staff and 1800 students. After 4 spray days (i.e. approximately 4 weeks) 8 staff were quite seriously affected, and a further 15 suffered more minor difficulties.<sup>55</sup>

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<sup>52</sup> See [Doc 90]

<sup>53</sup> Cf. para.7.7 and Dr Read's comment at para.13.42 above.

<sup>54</sup> [Doc 92]

<sup>55</sup> Mr Elliott's letter to Waikato times – 4.11.03 – [Doc 92]

- 13.67 Mr Elliott's knowledge of the effect on students was more limited because although some hundreds had stayed away from the School, he had no detailed information from the parents regarding the actual effects on the students. On the basis of the numbers of staff affected, he opined that probably 70 to 90 students could also be affected.
- 13.68 Mr Elliott described the effect on one staff member. She developed a swollen face, rashes, and blotches on her skin, a marked effect on her voice, and breathing became erratic and raspy within the space of about 3 hours. She needed urgent medical attention. Other staff needed constant medication to control the effect of the spray on their bodies. All those who were badly affected did have pre-existing or medically documented health issues and had allergy type disorders. Mr Elliott emphasised, because of the attitude of certain MAF officials, that these people were suffering very real physical disorders and not some hysterical psychological reaction to the spray. He considered the MAF medical team involved had failed to act impartially, and had blatantly played down and trivialised patients' concerns.
- 13.69 Mr Elliott was so concerned that he decided to complain to the Occupational Safety and Health Service (OSH), which provided a Final Report following an investigation of a complaint made on 24 October 2003.<sup>56</sup>
- 13.70 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.
- 13.71 The OSH Departmental Medical Practitioner for the Waikato Thames Regional Office, Dr Geraint Emrys, made contact with Dr Francesca Kelly and involved her in the investigation. Dr Kelly advised that she recognized that the fish allergy issue was real and extraordinary in terms of numbers of people affected. She noted also that one of the school staff had a rare and "worrying" food asthma and that she must avoid contact with spray. The doctors were in agreement that it was indeed extraordinary to have such a large cohort associated with a fish allergy. The problem was considered by medical personnel to be one of food allergy.<sup>57</sup>
- 13.72 Amongst the outcomes was an undertaking by Dr Kelly to improve orientation and medical consultation as steps to help ensure that people will actually volunteer information. As at 5 November 2003, AgriQuality had given an undertaking to ensure that all schools would be sprayed before 8

<sup>56</sup> Occupational Safety and Health Service – Fraser High School – Final Report – 25.11.2003 – **[Doc 93]**. There are some minor variations in the numbers of persons affected from those used by Mr Elliott.

<sup>57</sup> According to one of the MAF information sheets *Btk* is grown "in a nutrient brew which includes common food material such as corn soy and fishmeal" – **[Doc MAF 7]** (13.05 – 13.10 Vol.1)

a.m. for the remainder of the programme. I have not been informed whether that occurred.

13.73 The OSH Report contains the following conclusions, amongst others:

"Whilst the spray is essentially safe for public use, there are a few individuals who will experience allergies, respiratory problems or skin sensitivities as a result of exposure 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, a number of whom had rare food allergies.

"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. The effectiveness of monitoring health is dependent upon all concerns being reported to and comprehensively canvassed by medical practitioners."

13.74 Attached to the Report is an Appendix covering Dr Emrys's involvement. He visited the school on 28 October 2003, met with the staff, of whom 35 had reported problems in the questionnaire which Mr Elliott had circulated to his staff. Of them Dr Emrys had interviews with 13 who were present, and knew of four others who were absent having been advised by MAF to stay away. Of the 13, two had rare severe pre-existing allergies relating to food/fish which would require them to remain away from the spray zone. Five had exacerbations of asthma (which could be managed by a preventative treatment prior to the spray), and six others had symptoms of irritation or other varied health effects almost certainly caused by the spray. All of these were symptoms which had been previously recognized as associated with spray. Dr Kelly apparently advised Dr Emrys that there needed to be an improvement on the responses given to concerned individuals by the AerAqua doctors and nurses.

13.75 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.

13.76 It will be recalled that in the 8 weeks or so that the Hamilton programme lasted it was intended that those subjected were to receive approximately twice as much Foray 48B as West Aucklanders were due to receive in an equivalent period. MAF have now provided<sup>58</sup> records of the Hamilton spray programme. They show that on each of the eight sprays the whole of the 1253 ha within the relevant area were sprayed by a fixed wing Air Tractor 602. The quantity of spray delivered varied from 6000 to 8950 lts. carried out in four or five flights, usually from early to mid-morning. Most operations finished some time after 8 a.m. However it is not possible to tell from this material whether AgriQuality observed the undertaking to spray all schools before 8 a.m., which should have applied to the last four sprays. The

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<sup>58</sup> MAF 13.49 (added to [Doc 23])



possibility of duplication of spraying by reason of wind drift<sup>59</sup> cannot be ignored.

13.77 I have been provided with some more general information regarding complaints relating to the Hamilton spray programme.<sup>60</sup> I am informed that a petition was presented to Parliament containing 10,000 signatures opposing the spray programme.

13.78 I have also been given a list of reported ailments which shows that 202 people reported 705 spray related incidents and health concerns. These comprised:

- Respiratory problems, of which breathing difficulties – sore, painful or burning throats, congested nose, coughs, and asthma aggravations were the most common. 233
- Neurological complaints, of which headaches were by far the most common. 139
- Skin irritations. 79
- Eye infections burning, itchy, and soreness were most frequent. 67
- Digestive problems, such as nausea and diarrhoea. 61
- Fatigue, and a variety of miscellaneous other symptoms. 46

These of course correlate closely with the problems reported from Auckland, and with the cohort of cases at Fraser High School.

13.79 The information contained in the Hamilton HRA is based almost exclusively on the information available in respect of the Auckland spray programmes. However, it notes that extrapolation to the Hamilton situation has a number of major caveats. The West Auckland spray zone population was then regarded as approximately 160,000 compared with approximately 30,600 in the affected area in Hamilton. Reference is made to the large number of people going to and fro in respect of Auckland city, but as the Fraser High School situation showed, while no doubt the actual numbers would be far smaller, such events did occur. Population characteristics were also different, and the Assessment says:

"The spray programmes are very different. The PAM programme has involved nearly 2 years of spraying, initially on a limited area, but then expanding to a larger urban area with spraying at approximately 3 to 4 weeks intervals. The Hamilton operation is shorter (approximately 2 months), but with more frequent spraying (weekly)." - p.15

13.80 The Hamilton projections appear to have been based on approximately one-sixth of the numbers of people requiring practical support plans, medical assessment, and specialist assessment under the PAM Health Service. It

<sup>59</sup> [Doc.MAF 3]

<sup>60</sup> Waikato Against Toxic and Chemical Hazards - collated self-reported health concerns in Hamilton - October/November 2003 – [Doc 117]

was anticipated that the spray operation in Hamilton would use the same material and application rate as the PAM operation, i.e undiluted liquid Foray 48B, as manufactured, with an application rate of approximately 5 lts per hectare.

- 13.81 On the basis of information provided by the Ministry<sup>61</sup>, those subjected to the Hamilton spray programme received in the approximately eight weeks or so that their programme lasted, twice as much spray as West Aucklanders were due to receive in an equivalent time – see Table 1 - para. 12.12.

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<sup>61</sup> Email – Ian Gear – 30.9.03 – **[Doc 73]**

## 14. Government response to health and other issues

- 14.1 I refer now to the Government's response to the issues which arose in the wake of the use of Foray 48B. In my draft report I characterised the official approach to that substance as being that it was "benign and harmless to people", but I also noted that the Government had set aside some \$6 million for healthcare and associated issues.
- 14.2 It may be that I was a trifle harsh in my reference to officials, but in December 2002, just before the big spray operations commenced, a letter went to residents making reference to "a tiny number of people who have significant food allergies ...".<sup>1</sup> In percentage terms that proved to be so, but the actual number of people significantly affected was in the hundreds. As late as July 2003 at the HAG meeting there is the passage cited in paragraph 14.25 below referring to the need to maintain that the substance was a "harmless" product. It is to be hoped that will be so; but it has yet to be proved.
- 14.3 These references demonstrate an attitude of mind which is imprudent when dealing with people some of whom are unwell, and many of whom are being put to considerable inconvenience.
- 14.4 It will be recalled that considerable work was done in relation to the tussock moth, and it would have been reasonable to expect that the outcome of this work and research would have been available some two years later when the Painted Apple Moth became a problem. It was not apparent that this was so when I wrote my draft Report, but I now accept the Ministries' assurances that the research had not been lost, and that some at least of the same senior officials (together with additional ones) were involved.
- 14.5 In my draft Report I said that up to and including the Cabinet paper of August 2002, little attention seemed to have been paid to the possibility of human health impacts. I am now informed that that statement fails to take into account a quantity of material which may or may not have been made available to me, and meetings with Ministers of which, seemingly, no record has been kept.<sup>2</sup> However that may be, a change is detectable, at least to some extent, with the Cabinet paper of May 2003.
- 14.6 The catalyst for that change (in default of any other) appears to have been the availability of Dr Meriel Watts' report of 10 January 2003<sup>3</sup>, Ms Hana Blackmore's report of 15 February 2003<sup>4</sup>, and the Petrie, Thomas and Broadbent<sup>5</sup> paper published in The New Zealand Medical Journal of 14 March 2003. I have already commented on them.
- 14.7 On 20 March 2003 the Ministry of Health had announced a public consultation on the health impact of aerial spraying, and with effect from 1 May 2003, the Wellington School of Medicine had been contracted to

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<sup>1</sup> Letter 27.12.02 – [Doc 67AA]

<sup>2</sup> Cf. para.16.19 below.

<sup>3</sup> [Doc 38]

<sup>4</sup> [Doc 43]

<sup>5</sup> Then Associate Professors and a Reader in the Faculty of Medical and Health Sciences, University of Auckland – [Doc 46]

perform "the Collation and Analysis of Health concerns relating to PAM Eradication Programme."<sup>6</sup>

### **Cabinet Paper – May 2003 – Public Health Concerns**

- 14.8 Unlike the earlier papers, this paper had much to say regarding public health<sup>7</sup>. At its peak the sprayed area included over 43,000 households and over 193,000 people.<sup>8</sup> It was stated:

"There has been considerable concern among some residents about the potential risks to public health, and MAF has been working closely with relevant health and regulatory authorities (including the Auckland District Health Board, the Ministry of Health, the NZ Food Safety Authority and the Environmental Risks Management Authority) to ensure that any risks to public health are appropriately managed."<sup>9</sup>

The paper then makes reference to the Health Risk Assessment, which was essentially an update of that prepared during 1996/97 for Operation Ever Green, the white-spotted tussock moth eradication programme. The paper states the HRA contains recommendations for risk management and communication, all of which were said to have been followed by MAF during the course of the programme.<sup>10</sup>

- 14.9 In answer to this paragraph in the Draft Report, the Ministries, in their Schedule, set out a lengthy summary of the situation as they saw it, and presumably still do see it. There are some aspects of the Schedule note on which I should comment:

- i. "Officials note that there is a growing body of evidence reinforcing the findings of the Health Risk Assessments that were completed for the... eradication programmes. These independent studies were completed for the MAF by various authorities."

I assume the findings referred to are those indicating that on an epidemiological basis there is currently no evidence to suggest wide-spread or long-term health outcomes from the use of Foray 48B.

While that may be so, I notice that the latest material recognizes that some people have been harmed to some level. The precise numbers are not known, but there is evidence to support a figure in the range of 3000 - 4000 people. While of course that is a very small proportion of the 200,000 - 300,000 exposed to the spray, it nevertheless represents a significant number of people for whom provision must be made in the event of any future spray programmes.

- ii. "It was expected that a small percentage of the population would experience some effect from the spray programme. Officials and Ministers recognized that the impacts on some people would be very disruptive and uncomfortable."

While I accept, of course, that funding was made available for a health service, I do not recall seeing any statement to the effect that the

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<sup>6</sup> [Doc 52]

<sup>7</sup> [Doc 55A] - paras. 36 – 49 – Minster's paper supporting EDC Min (03) 11/1

<sup>8</sup> [Doc 120A]

<sup>9</sup> [Doc 55A] para.36

<sup>10</sup> Health Risk Assessment of the 2002 Aerial Spray. 30 March 2002 [Doc 16]

programmes would be "very disruptive and uncomfortable". The messages I have seen were not to that effect.

- iii. Reference is made to Dr Di Marco's report to the Hamilton City Council. As I have indicated elsewhere, he was not addressing the correct statutory question.
- iv. While I accept that the Wellington Medical School's report was not primarily directed to the question of safety, its findings nevertheless enable inferences to be drawn on that question.
- v. It is hardly surprising that the WMS report did not recommend stopping or modifying the existing spray programme since the report was not completed until February 2004, by which stage the task was almost complete.
- vi. I have noted the two recommendations quoted from the Overarching Report, and would regard them as the minimum necessary.

14.10 Reference is made (in the Minister's paper) to the PAM Health Service, which was established in January 2002 following consultation with a range of medical and other experts. Access was via the PAM helpline or by referral from a GP. The Health Service fielded thousands of calls from people with health-related concerns, and provided clinical assessments to approximately 840 people, of whom 100 were referred for specialist consultations. Reference is also made to the practical support plans available to householders where a clinical assessment identified that the householder should avoid the spray.

14.11 The most common symptoms reported were general concerns, asthma type symptoms, skin and eye rashes or irritation, hay fever-like symptoms, pre-existing food allergy and chemical sensitivities, and headaches – as predicted in the Health Risk Assessment. The Service initiated some 640 personal support plans, and during the then recent aerial operations 630 people received spray-day warnings, 120 people received meals outside the PAM zone and 152 people, plus 120 support people, were relocated to a motel for one or more nights. The Health Service's budget for 2002/03 was \$4 million.

14.12 Health monitoring involved the provision of individual medical assessments to concerned residents, while surveillance addressed the relationship between the health status of the community and the spray. A number of health trends were observed, including pregnancy, respiratory conditions, allergies, asthma, and chemical sensitivities.

14.13 Formal reports were to be provided to MAF and to the Ministry of Health on a monthly basis. I have received copies of those covering the period 1 January 2002 to 28 March 2004.<sup>11</sup> Unfortunately, the figures do not totally coincide in all cases, but by 28 March there were 3611 people registered with the PAM Health Service, 694 of whom were provided with Practical

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<sup>11</sup> [Doc 60]

Support Plans (PSP)<sup>12</sup>, and 1107 had been assessed one or more times by a doctor in conjunction with the PAM Health Service. As at June 2003, 625 had a PSP. The medical justification for such plans is shown in Table 4 below.

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

|   |  | June 2003 –<br>percentage –<br>people (total 625) | March 2004 –<br>applying similar<br>percentage –<br>people (total 693) |
|---|--|---|--|
| Highest severity                                      | E.g. anaphylaxis to relevant foods, multiple severe food allergy in child, very severe asthma.   | 7% 44   | 7% 49  |
| Significant medical                                   | E.g. definite or unstable asthma, eczema or upper respiratory with significant severity.   | 29% 181   | 29% 201  |
| Other medical   | E.g. short-term irritant symptoms or mild respiratory, mild skin problems, headaches.  | 29% 181   | 29% 201  |
| Precautionary because of a previous medical diagnosis | 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. | 19% 119   | 19% 131  |
| Mainly psychosocial justification                     | e.g. pregnancy or situational stress as justification. general concerns about spraying   | 16% 100   | 16% 111  |

14.14 I have relied on the June 2003 percentages in the absence of other reliable figures. This discloses a situation in which as many as 250 people were seen as severe to significant medical risks, and many more as facing lesser risks and inconvenience. These facts are not spelled out in the material I have seen which was supplied to Ministers. Nor is it clear whether this material was available to the HAG, and if so, what use was made of it, apart from a comment mentioned below, from Dr Tukuitonga.<sup>13</sup> However, I am advised that the Minister of Biosecurity and the HAG were kept informed, and that any unexpected issues were drawn to their attention. I have not been presented with any documentary information about this.

14.15 The paper then turns to the composition of the spray, acknowledges residents' concerns about that matter, notes that the manufacturer had, at every opportunity, "vigorously protected" the confidentiality condition in its

<sup>12</sup> A Practical Support Plan was a written plan detailing the support provided by the Health Service to individuals in order to assist them to avoid the effects of the aerial spray. These supports included motel accommodation, day retreat venue, financial assistance etc – **[Doc 60]**

<sup>13</sup> Para.14.27.

contract to supply. It is noted that the full list of ingredients was made available to the relevant regulatory agencies as well as to several other government agencies and key decision-makers. They included the Environmental Risk Management Authority, New Zealand Food Safety Authority, Ministry of Health, Auckland District Health Board, the Director of the PAM Health Service and the Minister and Associate Minister for Biosecurity.

- 14.16 There were proposals for the establishment of a PAM Health Advisory Group (HAG) and an Operational Health Group. The HAG would be tasked with providing high-level advice on the nature and delivery of ongoing health services, while the Operational Group would be responsible for implementing the recommendations of the HAG including the delivery of health monitoring, and a peer review of the Health Service. There is then reference to the review to be carried out by the Wellington School of Medicine, reporting to the Director General of Health later that year.
- 14.17 There is also reference to an analysis of public health concerns to be conducted by the Institute of Environmental Science & Research Limited (ESR), which had recently peer-reviewed the report on the health impacts of PAM programme prepared by a member of the community.<sup>14</sup>

"The Ministry of Health has asked ESR to compare the data contained in the community report with data held by the PAM Health Service and the Auckland District Health Board, and to advise on whether health outcomes are consistent with those expected in the PAM Health Risk Assessment and other literature."

### **Partial response**

- 14.18 However, it is possible that some echoes of the concerns in the three reports mentioned above were recorded in the Minister of Biosecurity's paper to the Cabinet Economic Development Committee at its meeting on 21 May 2003.<sup>15</sup> On 28 May the first meeting of the reconstituted PAM Health Advisory Group (HAG) took place<sup>16</sup>. I refer more fully to the HAG at paras. 14.25 et seq below.
- 14.19 On 2 July 2003 a meeting was held in Wellington of the various government agencies likely to be involved, to brief the agencies, and to discuss and develop, at a strategic level, the system requirements for effective management of health issues associated with the potential aerial application of Foray 48B in respect of Fall Webworm and Asian Gypsy Moth, the former being suspected in Mount Wellington and the latter in Hamilton.
- 14.20 There appears to have been a quite wide ranging discussion and an attempt to learn from the problems which had occurred in relation to PAM, but it is not clear whether any definite decisions were reached.<sup>17</sup>

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<sup>14</sup> The reference to the peer report appears to be to **Doc 35** dated 24 December 2002 which is the report on Hanna Blackmore's paper by Dr David Phillips. I am informed that the Ministry did not seek a further report from ESR as the information required was subsumed in the WSM report - Ministry's letter of 8.2.07

<sup>15</sup> **[Docs 55 and 55A]**

<sup>16</sup> **[Doc 57]**

<sup>17</sup> **[Doc 64]**

### Health Advisory Group (HAG)

14.21 A Health Steering Group (HSG) was established in September 2001. Its work led to creation of the PAM Health Service in January 2002. The HSG was then stood down.

14.22 The decision to proceed with mass spraying was made in August 2002. The new Health Advisory Group (HAG) was not established until May 2003. Consequently, apart from two operations in October and November 2003<sup>18</sup>, and the spraying at Hamilton, the mass spraying of parts of West Auckland (conducted between October 2002 and May 2003), had been completed before the establishment of the committee. Additionally, Dr Watts' Health Impact Report had been received, the Wellington School of Medicine Report had been commissioned, and an Asian Gypsy Moth had been discovered at Hamilton. I have been provided with copies of the Minutes of the five HAG meetings held between 28 May 2003 and 2 February 2004<sup>19</sup>. Draft terms of reference were ratified at the first meeting, but not finalised until what appears to have been the last meeting, on 2 February 2004<sup>20</sup>

14.23 The question then arises of what the HAG was able to achieve. The terms of reference as finalised stated that the purposes of the HAG were:

- "To provide a forum where key stakeholders can expose and examine issues affecting the health support and monitoring dimensions of the PAM project.
- To provide high-level advice to the PAM Project Director on the nature and delivery of needed health services.
- To bring expertise from across the relevant public sector and from the affected community to the leadership of the health monitoring services.
- To identify and prioritise health-related research projects for consideration by MAF.
- To scope health monitoring programme.
- To recommend changes to the programme on health grounds should these be needed."

Its function was to shape future services rather than be concerned with the day to day services of the PAM Health Service.

The following groups were to be invited to provide representation: Ministry of Health, Medical Officer of Health, Auckland, local government, Community Liaison Group, Maori community and Pacific Island community.

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<sup>18</sup> Sprays 26 and 27

<sup>19</sup> [Docs 57 and 65]

<sup>20</sup> See [Doc 62] and some quite critical comments in the C&AG's Report – [Doc 29].



14.24 At the first meeting<sup>21</sup> it was noted that in addition to the HAG, there was also an Operational Health Group tasked with "ensuring the work was completed"<sup>22</sup>, and its function (along with the Community Liaison Group) was to provide advice at an operational level only. Discussions were to be free, frank and confidential. Although the minutes record that a discussion took place around the impacts of the programme on the community and what might be an acceptable threshold, no advice appears to have been given. It is surprising that there appears to have been no express reference to the material created by the Tussock Moth Science Panel, nor to the Sinclair report, where much the same ground had to be traversed.

14.25 Amongst the matters discussed at the second meeting of the Group, on 4 July 2003, was how proactive the PAM Health Service needed to be in educating the public on its services "versus ensuring that the spray activity doesn't send a message that conflicts with btk being a harmless product". In response to the chairman's question as to what her agency would do differently if another PAM occurred tomorrow, Ms Kelly replied that there would need to be a different form of public communications which includes a well planned communications strategy. Ideally this planning would encompass details on demographic groups, food allergies, respiratory problems, family disruptions e.g. terminally ill, better liaison with the community and GPs, a single communications leaflet fully integrated with other PAM information, and methods of delivery to "hard to reach" groups. This meeting took place when MAF was preparing for the spray operations at Hamilton. Members were agreed on the basis of a model which would include

- a health service,
- that is sensitive to the community it serves
- and that is proactive.

This needed to be balanced with "not sending a message that conflicts with btk being a harmless product."

14.26 Simon Hales and Kevin Dew from the Wellington School of Medicine were present at that meeting, and the terms of reference for their impending report were discussed, but no one appears to have questioned the realism at this meeting on 4 July 2003 of a delivery deadline of 30 September 2003. (Nor does it appear to have been questioned by the contracting party, the Ministry.)<sup>23</sup> In the light of what appears later to have been Francesca Kelly's failure to take part in the WMS report process, it is noteworthy that at this meeting she appeared willing to be involved and HAG members agreed that her organisation should be involved, as it had acquired significant corporate medical knowledge in the course of its operations. No advice is recorded. Members seemed to be gathering information rather than imparting advice.

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<sup>21</sup> At the first meeting there were present Dr David Collins (Chairman), Ian Gear (Director PAM project), Iain Macdonald (Health Project Manager AgriQuality NZ), Dr Colin Tukuitonga (Director Public Health, Ministry of Health), Dr David Sinclair (Medical Officer of Health, Auckland DHB), Penny Hulse (Councillor, Waitakere City Council), Meredith Youngson (Health Link Coordinator), Taha Fasi (Taha Fasi Co Ltd) and Dr Guy Naden (Clinical Director TK 0H and Tamaki Health Care Organisation. Others were invited from time to time, but the only permanent additions appear to have been Dr Dell Hood (Medical Officer of Health and Clinical Director Public Health, Waikato DHB) and Pippa Mahood (Councillor, Hamilton C.C.)

<sup>22</sup> It is not entirely clear to what this phrase refers.

<sup>23</sup> Cf. Ministry's Schedule reference to para.14.30

14.27 At the third meeting, held on 14 August 2003, reference was made to a Biosecurity MAF exemption being sought, as the then current approval would expire on 18 January 2004. There was discussion about the monthly reports provided to the Ministry of Health. Dr Tukuitonga is noted as having advised the meeting that the report is more valuable to the Ministry of Health in that it allows the Ministry to report to the community and the Minister.<sup>24</sup> He asked whether there was a change in the Foray 48B spray formulation and whether that should be in the documentation. Mr Gear is stated to have advised that there was a change, dealt with in August 2002, which was approved by ERMA, but the changed formulation was not put into use until early 2003. In that context Mr Macdonald advised that the Group needed to make a conscious decision on the public concerns and how to [alleviate] them.

14.28 The fourth meeting took place on 24 October 2003, the same day as that on which the Principal of Hamilton's Fraser High School lodged his complaint with the Occupational Safety and Health Service. There is limited mention of the Hamilton operation, which had begun on 8 October. The Minutes record:

"The health support demand for AGM has been high but is starting to ease. Some householders have been moved out of the zone in part due to the intensive nature of the spray cycles and other persons have decided to move out on their own accord."

There is reference to public dissatisfaction with the health service provider 0800 service. Other concerns about the Hamilton operation were also expressed.

Clarification was sought of the differences between the Auckland and Hamilton operations, the following aspects were noted:

- "There are no changes in the of Foray 48B formulation application rate at 5 L rising to 7 L, however the spray frequency is higher in Hamilton."<sup>25</sup>
- There are demographic and ethnic differences. Age groups were similar.

<sup>24</sup> In its letter to me of 8 February 2007 the Ministry stated:

"There was no formal analysis of the information in the reports, but a summary of the Director of Public Health's views on the reports was published in media statements and copies of these are attached. Please note that only three media statements were released as there appeared to be no media or public interest in them."

In the media release dated 28 July 2003 – **[Doc 67A]** - after summarising the information in the first such report Dr Tukuitonga stated:

"The Ministry of Health will continue to receive monthly reports on the effects of spraying from the Ministry of Agriculture. The MoH has also commissioned an independent community consultation process to discuss and gauge health concerns relating to the Painted Apple Moth spraying programme."

That would appear to refer to the Wellington School of Medicine investigation.

<sup>25</sup> This seems at variance with what is stated in **[Doc 120A]** p.47, where it is said:

"The concentration of foray 48B formulation used in both the PAM and AGM programmes was identical. However, the application rates for each programme were different. The PAM programme used rates of 5 L per hectare, which was consistent throughout the programme. The AGM programme however, began the programme using 5 L per hectare, but increased this to 7 L per hectare as the caterpillars grew and the foliage became denser."

- The affected area is more industrial and residential however more people commute through the zone.
- Seasonal effects noted."

A further meeting was to have been held 1 December, at Hamilton, but that did not occur.

14.29 The final meeting took place on 2 February 2004. There was a variety of concerns expressed, and there seems to have been a lengthy discussion about health service strategies for future incursions. This was apparently the subject of a PowerPoint presentation which I have not seen, and seemingly has been lost. The HAG raised various potentially important issues but it is difficult to discover what answers were achieved, and whether they were translated into actions.

14.30 While the creation of these various entities, such as HAG, was no doubt helpful (although belated), and the funding of \$4.0m is significant, the urgency of their creation may seem to contrast with the earlier attitude that "no adverse health patterns were found, once patterns were examined at a population level". Two things stand out:

- The transformation from a relatively localised and targeted operation to widespread spraying without any in-depth study of the possible implications.<sup>26</sup>
- That notwithstanding more recent research<sup>27</sup>, there remains a continuing absence of reliable research into the present and future effects of the use of Foray 48B on a mass scale.<sup>28</sup>

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<sup>26</sup> Email exchange Gear/ Dr Sinclair ADHB - para.16.33 below

<sup>27</sup> **[Docs MAF 3 & 3A]**

<sup>28</sup> Cf. the repeated comment in "Our Case Against Moth Spraying" (**Doc 3**) (and the commentary on it **[Doc 8]**) "Concern is that there is inadequate research into the short and long-term effects of this product", and the concerns of the Tussock Moth Science Panel expressed in 1996 – Part 3 above.

## 15. Events following completion of the PAM and AGM Spray Programmes

### Report by the Wellington School of Medicine

- 15.1 On 20 March 2003 it was announced that the Minister of Health had directed the Ministry of Health to,

"contract a university to receive written submissions from the public regarding their health concerns related to PAM. The University will analyse these and report their findings to the Director of Public Health."

Arrangements were made to that end with the Wellington School of Medicine (in the University of Otago). The services to be provided under the contract were summarised as:

"You shall receive, collect, and summarise reports from the public, community groups, territorial authorities, AerAqua and the Auckland Regional Public Health Service (as well as other stakeholders, community groups, organisations and individuals) on their health concerns associated with the Foray 48B aerial spraying programme. You shall review existing scientific knowledge relevant to these health concerns, and recommend (but not carry out) scientifically robust methods of further study."<sup>1</sup>

- 15.2 The Agreement also required that a draft report for external peer review would be completed by 31 July 2003 and after allowing for a re-draft of the report, the final report would be provided to the Director of Public Health by 30 September 2003. Unfortunately, that time frame was not met. I examine the causes for that below in my consideration of the Role of the Ministry of Health<sup>2</sup>.
- 15.3 As will be seen below, the WSM Report became the subject of some quite critical comments from reviewers, both from within, and outside, the Ministry. A sharp disagreement developed between the Ministry and the Medical School over the process of completion of the Report, which seems not to have been resolved until 22 April 2004.
- 15.4 At that point, the then Acting Director of Public Health decided that it was in the public interest to release the WSM Report in its then current form, but together with the various other comments that had been received. That took place following a report to the Minister on 26 April 2004.<sup>3</sup> It will be recalled that the PAM aerial spraying finished in May 2004, and the AGM serial spraying was conducted during October and November 2003.
- 15.5 The Executive Summary to the Health Report from the Deputy Director General, Public Health to the Minister provided the following brief overview:

"The report does not recommend modifying or stopping the eradication programme and that there is no significant new information in the report that would lead Health officials to consider recommending modifications to the eradication programme. Whilst the report has a number of significant weaknesses, it does identify a number of issues around risk perception and social

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<sup>1</sup> Agreement between Her Majesty the Queen of New Zealand and University of Otago - Collation and analysis of health concerns relating to PAM. eradication programme – [Doc 102A]

<sup>2</sup> Part 16.

<sup>3</sup> Report to Minister of Health – 26.4.06 – [Doc 102E]

impacts associated with the aerial spraying programme and some theoretical risks on which the Ministry will seek further advice."

- 15.6 The Minister was informed that a number of other initiatives would be taken in relation to those parts of the report which were considered to be of use, and that further advice would be taken in relation to the areas where there appeared to be significant weaknesses.
- 15.7 While the Ministry expressed its dissatisfaction with the quality of the Medical School's Report, and it may be that it did not report different or additional symptoms from those previously recorded, it is I think of significance that the Report tends to confirm those complaints. From all of the information available to me they cannot be dismissed as imagination or exaggeration.
- 15.8 The Report states that its authors were not aware of any systematic monitoring of human exposures during spraying operations in New Zealand<sup>4</sup>.
- 15.9 However, in West Auckland and in Hamilton there have been two examples of very extensive, and intensive, spraying, and there was evidence in both places of deleterious effects to a significant number of people. I am now informed that such a study, by IESR Limited, was commissioned in June 2004. I shall refer to that below.<sup>5</sup>
- 15.10 The Report also, and so far as I am aware, uniquely, draws attention to the potential health effects of bioaerosols (a fine suspension of biological matter in air) in such a situation.<sup>6</sup> The symptoms referred to in the text are markedly similar to those reported by those living, or temporarily within the spray areas.<sup>7</sup>
- 15.11 The Report addresses the topic of potential pathogenicity of *Bacillus thuringiensis*, or *Bt*, from which the substance *Btk* in Foray 48B is derived.<sup>8</sup> Two toxicological reports have been produced (by the same toxicologist) neither of which supports the ingredients of Foray 48B being the cause of the illnesses which have occurred.<sup>9</sup>
- 15.12 I have no ability to scientifically question those assessments. However, I note the acknowledgement in the Frampton report that several studies, both here and overseas,

"have shown the range of symptoms can occur after exposure to *Btk* aerial applications. These include neuropsychiatric problems such as anxiety, dizziness, sleep problems and difficulty concentrating, and physical symptoms

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<sup>4</sup> Wellington School of Medicine Report - *Assessment of the potential health impacts of the Painted Apple Moth aerial spraying programme, Auckland* - February 2004 - Hales and others – p.43. I am informed that health effects were monitored, and reported monthly by Aeraqua.

<sup>5</sup> [Doc MAF 6] – Gallagher et al. 29.9.05

<sup>6</sup> Ibid

<sup>7</sup> Hales and others. p.44. I have removed the expression "spray victims" at the Ministries' request, but it needs to be realised that that was how many of them saw themselves.

<sup>8</sup> Ibid. pp.45 - 47

<sup>9</sup> Report to Hamilton City Council on Foray 48B - 30.10.03, and Report to Waitakere City Council on aerial spraying with Foray 48B -12.2.06 - both by Dr Peter Di Marco (Benchmark Toxicology Services Pty Ltd) – [Docs 87A and 127]

such as irritation of the throat, nose, eyes and skin, headaches, chest tightness, flu-like symptoms, stomach discomfort and diarrhoea".

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.

15.13 In the light of the various criticisms of the Medical School's Report, I sought comment from the principal authors of the Report, Mr Simon Hales and Professor Alistair Woodward.

15.14 Mr Simon Hales replied in some detail<sup>10</sup>. He noted that the terms of reference were narrow, but stated that the Report covers each of the required areas. He and his colleagues presented no conclusions about the extent to which symptoms could be attributed to the spray (or whether or not the spray should continue) because those issues were outside the terms of reference. However, he noted that there is broad agreement amongst almost all concerned that the spray causes irritant symptoms, and exacerbation of pre-existing symptoms such as asthma and allergies in some people.

15.15 With reference to the methods for describing symptoms etc (which were to some extent dictated by the terms of reference and also by resource and time constraints) they allowed the team to describe the range of symptoms, effects and concerns reported but did not allow for the drawing of conclusions about the cause of the symptoms or their frequency in the exposed population. Mr Hales accepted that there could be a weakness in the Report in that respect.

15.16 I asked for guidance as to the weight that could be attached to the Report having regard to the criticisms. I quote Mr Hales's response virtually in full:

"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.
- 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.

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<sup>10</sup> Letter - Hales/Smith - 13.5.04 – [Doc 103AA]

- The ERMA approval of a closely related biological insecticide was based, in part, on incorrect assumptions.

"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...."

Mr Hales concluded by stating:

"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."

15.17 Professor Woodward adopted what Mr Hales said<sup>11</sup>, and added:

"When considering the criticism of the report, it is important to bear in mind the terms of reference we were given. The Ministry asked us to describe the concerns expressed by people in West Auckland who believed that they had been affected by the spray. We were also asked to review the recently published literature, and recommend studies that could be undertaken to fill significant holes in our knowledge of *Btk* sprays and human health. The research team was not asked to supply a representative sample of the population, nor was the team asked to investigate whether the spray caused symptoms reported to us.

"Consequently, in my view, little weight should be given to the argument that the report was deficient because it did not recruit a larger and more balanced sample of participants - this was not our brief. Similarly, the criticism that the report failed to establish the validity of complaints missed the mark, because we never attempted such an assessment.

"In summary, I suggest it is important to appreciate the limited nature of our report, and that the objectives were set by the Ministry of Health, not the Wellington School of Medicine.... "

15.18 At this late stage of my investigation, it still appears that issues raised so long ago as 1996 and more recently, by:

- The Tussock Moth Science Panel;
- The Sinclair Report;
- The PAM Health Advisory Group; and
- The School of Medicine's Report,

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<sup>11</sup> Letter - Woodward/Smith -20.5.04 – [Doc 103AB]

remain to be fully addressed despite the Gallagher *et al* Study, the Frampton *et al* Report and the Overarching Report.<sup>12</sup>

I am not convinced that the 3000 to 4000 people mentioned below in paragraph 15.26 can be dismissed as "a very small group of people have reported effects". We simply do not know, from community to community, how large that "very small group of people" may prove to be. I therefore endorse the views expressed at page 25 of the Overarching Report, but as a minimum requirement.

### **Cabinet paper - June/July 2004 - Public Health Concerns**

- 15.19 The Minister of Biosecurity's paper to the Cabinet Economic Development Committee,<sup>13</sup> some six months after completion of the AGM spray programme at Hamilton, records the existence of a range of science research projects in support of the eradication programme, but none actually in existence in relation to human health. From information now available, it appears that some were planned.
- 15.20 The paper records that the Health Risk Assessment made prior to the commencement of aerial operations<sup>14</sup> found that people directly exposed to the spray, or substantial spray deposits, may complain of minor skin, or upper respiratory tract irritation, or aggravation of existing asthma or allergies. It is surprising that despite the identification by clinical assessment of some 700 people who did require practical support to avoid the aerial operations, as well as those who needed other assistance or treatment, there is no qualification of the suggestion that complaints would be only minor in nature.
- 15.21 The paper does, however, say that should future aerial operations be found necessary, health support would involve identifying those members of the community with a medical need to avoid the aerial operations. This might operate under a revised health support model, then being explored, in which management of practical support, such a provision of motels etc, is separated from medical assessment.
- 15.22 It is also recorded that the Ministry of Health had stated that the symptoms generally reported were in line with the expectations of the Health Risk Assessment. MAF was also managing a health monitoring strategy to investigate any public health impacts, at a population level, associated with the aerial application of Foray 48B. The Ministry of Health was then understood to be commissioning further analysis of some aspects of the report it had obtained from the Wellington School of Medicine, before considering whether it needed to recommend to MAF changes to the eradication programme. It is also noted that some 30 claims for compensation under the provision for compensation in the Biosecurity Act were being considered by MAF.

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<sup>12</sup> Respectively, [Docs. MAF 6, 3 and 3A]

<sup>13</sup> [Doc 105AA/3]

<sup>14</sup> [Doc 16] – 30.3.02



## Health Surveillance (2005) of the PAM operation

- 15.23 In June 2005 MAF released a Health Surveillance of the PAM operation.<sup>15</sup> This post-dated the Wellington School of Medicine's report to the Ministry of Health, but does not cite that report in its schedule of references. It appears that the Ministry did not consider that it was necessary to seek the views of the WSM. Perhaps a somewhat surprising decision.
- 15.24 The data indicates that 3,888 householders presented to PAM Health Service, and their complaints were classified as predominantly;
- General 47%
  - Digestive 25%
  - Eyes 24%
  - Neurological 22%
  - Respiratory 64%
  - Skin 29%
  - Social problems 21%
- 15.25 Although the analysis is exhaustive, and doubtless statically accurate, it cannot avoid the fact that between 3000 – 4000 people were significantly concerned about the health of themselves and/or their families. The fact that the vast majority of people within the area did not complain to the Health Service may of course mean that they were not affected. Some perhaps could not be bothered to complain, or may have assumed it would be useless to complain because the Government had decided the programme was to go ahead, or because the service was not well-regarded in some quarters.
- 15.26 It is not practicable for me to summarise the wealth of detail that is included in this Survey, nor am I sure that it would be helpful in this report to do so. However the latter part of the Survey provides a summary of the views of the compilers, and accepted, I assume, by MAF, and I propose to quote extensively from it for that reason.

### “6.4 PATTERNS OF PRESENTATION TO THE PAM HEALTH SERVICE

The PAM Health Service was set up in December 2001 as an independent medical service to provide free health support for residents, as required, to prevent or respond to health effects from spraying. Throughout the course of the eradication programme, to 4 July 2004, 3,636 householders contacted the health service and were included in a medical records database (health register) with 27,646 associated encounters with health service staff, either "face to face" at consultations or over the telephone.

“The analysis of patterns of presentations to the health service has included a subset of 9,546 health symptom/ query encounters that arose during a two-year period up to 30 December 2003 and related to 3,888 individuals. At the time this analysis was designed and commenced it was not known when aerial spraying might cease altogether. Some individuals who actively refused to identify themselves, or who expressed refusal to have their records included in statistical research, were excluded from the analysis. Over 300 additional individuals with individually identifiable health information, mostly children but a few male partners, had been included within the information provided during a registered contact by another (usually their mother).

<sup>15</sup> "A Study of Presentations of the Householder Concerns to the Painted Apple Moth Health Service and Auckland Summer Symptom Survey" - June 2005 – Aer'aqua Medical Services Ltd. [Docs 120 and 121] - cf pp.55 & 56 Vol.1 [Doc 120]

Each of these identifiable individuals had a separate record created in the analytical dataset, especially to ensure that age-group analyses were informative.

“Analyses of symptomatic patterns from the presentations (encounters) were primarily done using the International Classification of Primary Care 1998 (ICPC-2; second edition). This organises individual symptoms into organ systems. Results for frequencies of presentations from organ systems are shown in the report according to:

- residential exposure status
- medically diagnosed status
- receipt of a Practical Support Plan(PSP)
- age and gender

“Selected ICPC symptom codes were ascertained based on clinical experience by the Health Service doctors and grouped to provide definitions of typical "clinical syndromes" seen by those doctors. Frequency of occurrence of the syndromes was then described in the report. Finally atopic codes were selected and frequency investigated.

“The complexity of concerns voiced by householders contacting the Health Service, reflected the spectrum of frustration and anxiety of the general population in perceived harm and loss of control by a change of environment. This was evident in the subsequent enquiries by householders following every major media release and in reaction to information released by a well-organized protest lobby. Although stressors such as low flying aircraft, had been assessed prior to the programme, disinformation which caused widespread alarm amongst a small proportion of householders directly affected had not been taken into account, as it had been unforeseen.

“The proportion of householders contacting the health service displaying irritability, frustration, anger and anxiety, outweighed those who suffered pre-existing mental illness. Although it would be expected that sleep disturbances may have been significant, in fact they were not widely reported even in those householders who were disturbed by early morning warn calls.

“Whilst the spray programme caused disruption to the daily life of those relocating, whether on their own accord or with the support of the PAM Health Service, the effects of relocation varied according to situational and individual differences in adapting to such disruption.

“Encounters by telephone were most often complex, either because the health of more than one householder was discussed, or that the nature of the health concerns raised included both existing and often multiple medical conditions, which may or may not have relevancy to exposure to Foray 48B.

“The discussion for chapter 4 systematically outlines the relative frequencies of outcomes, measured as ICPC codes within organ systems, in relation to factors such as exposure, use of PSPs etc. The distribution pattern of reported symptoms from organ systems was stable across age, gender, exposed or not, medically diagnosed or not. However relative frequencies were greatest in women, age groups other than young adults, those with a medical diagnosis, those who had any sort of PSP and markedly greater among those with a relocation PSP. These patterns are somewhat predictable but the surprising finding has been that the least trends were present for asthma, respiratory (all symptoms) and to a lesser extent skin. This is the opposite of what might be anticipated if there were a community dose-response to an environmental irritant released through aerial spraying.

“It was apparent that the patterns of self reported symptoms were similar among those within the spray area compared with those outside the spray area. Enquiries from residents in the area reflect health concerns, but not necessarily the reporting of existing symptoms. For example, respiratory awareness and general health concerns are significantly more common (and more evident) to the population as a whole, than genitourinary or ear conditions. These patterns therefore may be reflective of normal population health concerns and symptom reporting, which may be prevalent at the time, e.g. seasonal rhinitis due to pollens.

“The PAM programme provided an opportunity to examine, among a largish population exposed to Btk aerial spray, patterns of presentations related to health. Householders contacted the PAM health service about an even wider range of health symptoms, questions and experiences than was anticipated prior to the programme. However symptoms from organ systems expected to relate to airborne irritancy, such as respiratory and skin, showed a lower gradient than other unrelated symptoms in relation to exposure, medical diagnosis or uptake of PSPs. This is not reflective of a dose-response to an environmental agent impacting on skin, eyes, nose throat or airways.

#### “6.5 AUCKLAND SUMMER SYMPTOM SURVEY

One limitation of an analysis of problems, symptoms and queries presented to the Health Service is that it is uncertain whether the patterns are representative of other people's experience within the community. To contribute to an understanding of overall patterns of health symptoms within the community, a survey was organized during the late summer of 2003/4. This included a random representation of census meshblocks exposed to differing degrees of duration of aerial spraying against PAM. Eleven thousand households in selected meshblocks received hand-delivered forms for voluntary completion and postal return. All the meshblock surveys were carried out in similar time frames, which avoided the possibility of different patterns of symptoms reported due to seasonal effects.

“The return rate for the survey was low. However the demographic characteristics of respondents were similar for all exposed and control areas, suggesting that it is valid to compare results among areas despite the inability to infer that absolute patterns represented others who did not respond. A presumption behind the study analysis is that respondents were similarly motivated to participate in exposed and control areas so that symptoms could be analysed in relation to exposure status, in spite of lack of generalisability to experiences of non-respondents. There has been no attempt to relate absolute frequency of symptoms to community health status. Instead it is presumed that respondents may be either more aware of health symptoms or more interested in filling in questionnaires than others who did not respond. Accordingly it is likely health symptom frequencies are higher among respondents than others, regardless of spraying.

“Percentage of respondents who experienced each symptom, as well as frequencies with which those symptoms were experienced, were unrelated to duration of spray exposure. However respondents from areas with any duration of exposure reported more symptoms than respondents from areas without spray exposure at all.

“Another key aspect of the survey design was to include symptoms that have a high association with exposure to environmental irritants, some symptoms that are general in nature and others that are unassociated with environmental irritation or atopy (distractors). If environmental irritation by spray formulation had produced health effects, a pattern was expected among the symptoms themselves. This did not arise. Respondents from exposed areas had higher frequencies of symptoms of all types, suggesting increased health awareness or attribution of a very wide range of health experiences to the occurrence of spraying. Response rates were higher in all exposed compared to control areas. This supports an interpretation that the higher frequencies reflect heightened health awareness among some people in spray zones.

#### “6.6 ODOUR PERCEPTION AND SYMPTOM REPORTING

“The Painted Apple Moth eradication programme has been highly controversial. Some residents felt they were being subjected to "chemically toxic bombardment". These fears could not be assuaged by the disclosure of the component list of Foray 48B for commercial reasons. This led to the perception of a small number of individuals that public officials were not forthcoming with information and that there might be something to hide. Allied to this issue of public perception querying the validity of official health information is the history of occasional discoveries of harm associated with previously trusted products, e.g. asbestos insulation and lead in petrol.

“To some extent, highly active and vocal opponents of the programme succeeded in gaining media exposure for their views. Individuals in West Auckland were encouraged via media such as newspapers, talkback radio and internet, to attribute any symptoms they may have experienced to the aerial application of Foray 48B.

“Protesters at one stage reported the results of an attempt at reverse-engineering to identify the spray ingredients. The process was flawed in that it identified "added" chemicals incorrectly (e.g. organic compounds produced by the natural breakdown of foodstuffs in the spray were assumed to be part of the ingredient list). This led to misinformation and fear as to the "toxicity" of the spray and served to further fuel controversy over perceived health effects.

“Exposure to significant concentrations of toxically hazardous materials may be signalled by odour perception and odour-related symptoms, and illness can occur from exposure to some chemicals, but this is frequently not the case. For example, common industrial sulphur gases are often associated with symptom reporting when levels barely exceed the odour threshold. Although physiological activity can partly influence symptoms from airborne chemical exposure, these symptoms can also be influenced by beliefs or models of exposure risks. An important factor in an individual's response to a chemical is their accumulated knowledge of exposure effects (Dalton, 2002).

“Personal and community belief regarding the quality of the environment and risk to an individual's health is an important factor in disease aetiology. Attitudes and opinions influence illness-related behaviour. Psychological factors, especially beliefs about ill-health can play a large part in many illnesses.

“Before the discovery of germs, unpleasant odours were believed to be carriers of disease (poisonous miasmas). Latterly this perception is evident in beliefs about becoming sick from exposure to environmental odours.

“Psychogenic illness also demonstrates how psychological processes play a part in illness perception; large numbers of individuals report symptoms that cannot be explained or accounted for by medical or environmental testing. Unidentified odours have been documented as eliciting more than 50% of reported outbreaks of psychogenic illness (Colligan, 1982).

“Concern about the health effects of exposure to chemicals may in fact increase awareness of common bodily sensations. Vague sensations may be unconsciously magnified and misinterpreted in an attempt to fit expectations. When an individual believes they have suffered chemical exposure involuntarily, symptom perception may be amplified (MacGregor, 1996). The stress engendered by the belief that the individual has been exposed to a chemical hazard itself intensifies somatic responses. Stress-mediated catecholamine release produces responses such as dry mouth and increased heart and respiratory rate, and this response can be misinterpreted as an "exposure reaction".

“Differences in personality type can contribute significantly to the variation in symptom and irritant perception in healthy individuals. Negative affectivity (NA), is identified as a unique personality construct featuring: feelings of nervousness and worry, chronic negative mood states, pervasive feelings of discomfort, introspection and the tendency to dwell on the negative aspects of the self and the world (Watson, 1984). Individuals who are high in NA are more likely to experience distress when overt stressors are not present, are over-alert when assessing their environment, interpret vague or ambiguous stimuli in a negative fashion, and report more subjective health complaints (Watson, 1989).

“When the media reports the consequences of "exposure" to environmental contamination, they are generally non-specific, common symptoms. In making the link between commonly occurring symptoms and environmental factors, individuals undermine their perceived health status. Negatively interpreting normal symptoms as a

pathological response to environmental factors influences health-seeking behaviour. (Petrie, 2001).

"Individuals often report physical symptoms attributed to emissions despite the fact that environmental monitoring frequently shows very low levels of airborne contaminants at levels not sufficient to cause acute or sub-acute symptoms. When sensory information is weak, cognitive influence becomes the principal factor guiding interpretation and awareness of sensory and somatic stimuli (Pennebaker, 1982).

"Researchers in Ontario, Canada (Luginaah, 2002) studied the community health impact of a five-year emission reduction plan at a refinery in Oakville, Ontario. They found that despite significant improvements in emissions from 1992 to 1997, some residents continued to report adverse health effects at a level inconsistent with emission levels. The investigators felt that the persistence of these health concerns indicated the existence of individuals who may have been reporting ill-health in the absence of harmful effects from the refinery.

"Investigators at the California Department of Health Services (Shusterman, 1991) retrospectively reviewed three studies conducted near hazardous waste sites in Southern California. Significantly positive correlations were found between the prevalence of headaches, nausea, eye and throat irritation, and both frequency of odour perception and degree of worry. The authors postulated that odours could function as a sensory cue for the manifestation of stress-related or autonomic symptoms such as headache and nausea among people who had concerns about the quality of their environment. They also stated that the observed increase in throat and eye irritation and its similar pattern with respect to the two variables, may be interpreted as evidence that odour and worry heighten symptom perception or recall (resulting in recall bias). Recall bias occurs when an adverse health outcome, factors like odour perception, or publicity surrounding a contentious environmental issue, influences an individual to remember symptoms. The investigators stated:

"Such bias is suspected when uniform elevation of symptoms with diverse etiologies is observed".

"Opinion surveys have shown that heightened risk perception is associated with involuntary exposure, perceived lack of benefit, lack of community control over operations and the "exotic" nature of the threat (i.e. unknown chemicals) (Slovic, 1985). Risk perception is also increased when the public official response to questions from the community regarding potential health risks are vague, contradictory, not timely, or overly technical (Neutra, 1985). ....

## "6.8 PREVALENCE OF CONDITIONS IN NEW ZEALAND COMMUNITIES

"Appendix K presents information about prevalence within the community of various diseases or allergic or congenital conditions. The reason for inclusion of this information is that individuals with some of the conditions represented in the table in Appendix K, or with other similar conditions, have entered preventive plans for spray avoidance. In each individual instance there are various reasons for the health service doctors to make such a recommendation. It is hardly ever simply based on presence of a particular condition, with the notable exception of severe allergy to foods present in the broth used to ferment the Btk. It will be apparent that numbers in PSPs are far fewer than might be anticipated if everyone avoided presence in a spray area by reason of a particular medical condition that concerns some in regard to spraying.

"What then are these additional individual risk factors that make spray exposure a potential concern to some? They are individual and clinical, social or philosophical. Clinical risk can be variable depending on the degree of exacerbation or control at any one time of conditions such as asthma or infantile eczema. Individual clinical risk can also be influenced by past experiences of aggravators, especially for people with

atopy<sup>16</sup>. Social factors can relate to family circumstances at the time when dealing with ill health in a family member. Philosophical factors may show themselves through individual choices in how to approach self-management of health experiences and environmental exposures.

“Clearly most people with asthma or atopy in the community did not contact the PAM health service. Otherwise the service would have been overwhelmed. Some did and a few of those people had clear-cut individual risk that necessitated avoidance of the spray. Others entered personal precautionary plans for a complex combination of reasons including past health experiences, social and philosophical context.

#### “6.9 VALIDITY OF HEALTH RISK ASSESSMENT

“The Health Risk Assessment prior to the programme indicated that the intended use of Foray 48B would be generally safe for the public. A few individuals might need to take avoidance precautions and many with asthma and skin conditions were advised to maintain preventive medication as a general measure and update self-management plans with their usual doctors.

“The findings from this analysis of the health service experience support the validity of those recommendations. However the experience has also clearly shown that there are some individuals who can be at risk. It is presumed that most such people were identified through self-referral to the health service after public communications about food allergy and severe asthma. The health service relied on adverse event reporting through statutory channels to the Medical Officers of Health and incident reporting to the health service itself to identify instances where preventive action failed. Detailing the few such occurrences is outside the scope of this report because the information can be individually identifiable. But the few instances that arose re-inforced the need for processes put in place by the health service in conjunction with public communications by MAF and efforts by the Regional Public Health Service.

#### “6.10 IMPLICATIONS FOR FUTURE PEST ERADICATION WITH BTK

“Perception of risk must be assessed in context of time and place. Significant to the timing of the PAM aerial operation are the September 11" acts of terrorism, the Coalition War in Iraq and New Zealand's involvement in Afghanistan. Subsequent acts of terrorism in Bali, bombings which directly affected Australasians, and extensive media coverage of political detainees within New Zealand, may heighten anxiety for susceptible residents, including recent immigrants or refugees, if exposed to low flying aircraft or aerial spraying.

“A previous Health Risk Assessment in Auckland, has indicated an increase in anxiety in those residents within the exposed population. (Auckland District Health Board, 2002) It is likely that anxiety would occur where there is loss of control of their environment, by exposure to the spray or experiencing events beyond their control. This would be expected particularly in residents with existing anxiety disorders who could experience an exacerbation of their condition (ADHB, 2002).

“Current health perception issues, which have been influential within the New Zealand context, have been the extensive reporting by the media, of the protest movement, promoting the view of detrimental effects of ground and aerial spraying in pest control. In this environment it would not be surprising if residents suffered increased anxiety as a result of continuous exposure to such information. (Petrie, 2001)

“Stressors and anxiety could be anticipated as influenced by:

- Low flying aircraft, both fixed wing and helicopter
- Health concerns related to existing conditions in particular pregnancy, respiratory, allergy related or psychological disorders

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<sup>16</sup> Atopy = a form of allergy in which a hypersensitivity reaction such as eczema or asthma may occur in a part of the body not in contact with the allergen -

- Misinterpretation and dissemination of incomplete or incorrect information in regard to the contents of the spray and risk of exposure to the spray
- Differences in perception and psychosomatic responses attributable to individual and community beliefs or negative affect, for example, the sensory perception of unpleasant odour.

“As outlined in chapter 4, there were a greater than expected number of females than males, who made contact with the health service, either on their own behalf or for those in their care. While this may be accounted for by gender role differences in accessing of health services in general, a more complete explanation has to include the role those women took asking about precautions for their families or reporting symptoms they knew of that were experienced by others. This poses some need to reflect on best possible provision of accurate information to those most likely to require it. Future programmes may take into account the need for provision of education using channels most likely to be accessed by women as majority information seekers on behalf of others in the community.

“In the PAM programme the need for a response to the pest had a very short timeframe for implementation. This necessitated public communications, including about health, that were delivered very little in advance of spraying itself. It is remarkable that many people with medically significant problems came forward early in the programme and entered PSPs prior to experience of risk. In reality a useful list of people had been compiled by MAF in Wellington in case spraying was started, although health service contact with people was delayed until eradication was authorised by government. It is clear that effective preplanning for a health response will ensure appropriate uptake of health advice....”

15.27 I have received a copy of AerAqua Medical Services Ltd's report to AgriQuality Ltd entitled, “*A Comparison of Presentations of Householder concerns to the Painted Apple Moth (PAM) and Asian Gypsy Moth (AGM) Health Services*”, also of June 2005.<sup>17</sup> It is a very full statistical analysis of the data arising from the PAM and AGM operations. Again I am unaware of whether this information has been referred to the Wellington School of Medicine – though seemingly not.

15.28 Since the above information was provided I have received a quantity of much more recent information, such as the Frampton and Wren Reports,<sup>18</sup> some of which seems not to wholly coincide with what I have quoted in paragraph 15.26.

### **Foray 48B Formulation**

15.29 Concerns have been expressed in some quarters about the concentration of Foray 48B formulation used in both the PAM and AGM programmes; concerns probably heightened by the confidentiality attaching to some aspects of the formulae. Apart from a minor change of formula used in relation to PAM from early 2003, I am informed that the concentrations were identical and that the health hazard profile did not change. No doubt that formula was also used for the AGM programme. The second formula was apparently used for the heaviest concentrations of spraying from January through to May, 2003.

15.30 Because of the concerns mentioned above and some references to substances described as BIT and Proxel, I have sought further information

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<sup>17</sup> [Doc 120A]

<sup>18</sup> [Docs MAF 3 and 3A]

from ERMA on this matter. I have been informed by ERMA<sup>19</sup> that the change approved by ERMA on 12 August 2002 was made in reliance on confidential formulation details provided to ERMA by the MAF Agricultural Chemicals and Veterinary Medicines Group.

- 15.31 The reference in ERMA's letter of 12 August 2002, to BIT is not to a trade name preservative product but is the abbreviation for the chemical substance *1,2-benziothiazolin-3-one*, that is used as an active component in trade name preservative products designed to be added as a component (usually at quite low levels) to other formulations as a preservative. *1,2-benziothiazolin-3-one* can occur at various concentrations in a number of different trade name preservative products. One of the common trade name products used as a preservative component in pesticides and other formulations is Proxel.
- 15.32 The classification of a product in respect of skin sensitiser properties due to the presence of *1,2-benziothiazolin-3-one* is determined by the total content of this chemical in the product and not by the amount of the trade name preservative component present. For example, if a trade name preservative component was present in a pesticide formulation at 0.2% and this component contained 20% *1,2-benziothiazolin-3-one*, then the total content of this chemical in the pesticide formulation would be 0.04% (presuming it was not also present in any other component in the product).
- 15.33 On the basis of the confidential information provided, ERMA had no evidence to suggest that any other component in the Foray 48B formulation, other than the trade name preservative component, contained *1,2-benziothiazolin-3-one*. Therefore ERMA determined that there was a total content of *1,2-benziothiazolin-3-one* in the new formulation of Foray 48B of 0.038% (380 ppm).
- 15.34 It was accordingly concluded that BIT levels below the trigger level of >500 ppm would not result in the classification of a product as a skin sensitiser. That view was supported by the British All Approvals Holders letter of 8 October 2003.<sup>20</sup>
- 15.35 On the basis of those evaluations ERMA advised MAF that it was satisfied that the hazardous property profile of the new formulation of Foray 48B was the same as the old formulation, and that the new formulation was sufficiently similar in composition to the old formulation for it to be covered by the registration of the old formulation under the transitional provisions of the Hazardous Substances and New Organisms Act.
- 15.36 There is also some debate about the apparent falling away of reported ailments during the latter part of the AGM programme when foray 48B was being applied at Hamilton at the rate of 7 l/ha rather than the 5 l/ha initially intended, and apparently used throughout for the PAM 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.

<sup>19</sup> Letter – ERMA/Ombudsman – 6.9.07 [Doc 137]

<sup>20</sup> Issued by the Pesticides Safety Directorate, Dept. for Food, Environment and Rural Affairs (UK) and still apparently current. [Doc 18AA]



- 15.37 For present purposes what I believe to be noteworthy is that although there may have been variations between the two areas in relation to the frequency of symptoms of discomfort, there is a very clear uniformity in that the discomforts were the same, and they were substantially the same as those displayed by people affected by the Operation Ever Green spraying. They accord with those predicted in the relevant HRA.
- 15.38 The Report appears to me to confirm very clearly that spraying with Foray 48B does cause a significant number of people to be physically affected, and to be prepared to put themselves to some considerable inconvenience by removal to avoid the spray.

## 16. Role of the Ministry of Health

- 16.1 The role of the Ministry of Health in relation to "public health" is expressed in the widest terms in section 3A of the Health Act, 1956. That section states:

"Without limiting any other enactment or rule of law, and without limiting any other functions of the Ministry or of any other person or body, the Ministry shall have the function of improving, promoting, and protecting public health."

The expression "public health" is defined, by reference to the New Zealand Public Health and Disability Act 2000 s.6(1), to mean:

"the health of all of -  
 (a) the people of New Zealand; or  
 (b) a community or section of such people"

The Act also provides for the appointment of a Director of Public Health, whose functions include the provision of advice or reports to the Minister, and a Public Health Group with wide powers and duties of consultation.<sup>1</sup>

- 16.2 The principal complaint against the Ministry was that it had not pursued its obligations under the Health Act 1956 and/or other relevant legislation. The Ministry stated<sup>2</sup> that it appeared that the only action that could be undertaken under the 1956 Act would be to abate a nuisance. It then discussed the legal advice which MAF had obtained on that issue. However, this reference to "nuisance" seems to overlook the Ministry of Health's position as a core central government agency with direct access to Cabinet through the appropriate Minister.

- 16.3 The Ministry added:

"As you know MAF is the lead agency for the eradication programme of the Painted Apple Moth and is undertaking those actions pursuant to the Biosecurity Act 1993. MAF contracted the preparation of a Health Risk Assessment, and it was on that advice that MAF advised the Minister for Biosecurity on any likely health impacts as a result of the spray programme.

"The health risk assessment was reviewed by the Ministry of Health's senior toxicologist prior to being finalised. The Director of Public Health reviewed the report and was reassured that the report's conclusions were evidence-based and reasonable.

"MAF, the Ministry of Health, the Ministry of Fisheries and the Department of Conservation have a Memorandum of Understanding that clarifies the agencies' responsibilities under the Biosecurity Act. The Ministry of Health's responsibilities in terms of the MOU are to provide advice to Government on all matters relating to human health; and to administer and implement a variety of health-related legislation. For the purposes of the Biosecurity Act 1993, the Ministry of Health's priority is to enforce the relevant provisions of the legislation so as to protect public health from the adverse effects of exotic organisms."<sup>3</sup>

- 16.4 For the Ministry to have restricted itself to whether a "nuisance" in terms of the Health Act had been created seems a very narrow view of the terms of the Memorandum of Understanding. While the Ministry does indeed have

<sup>1</sup> Health Act 1956 sections 3B, and 3D, 3E and 3F.

<sup>2</sup> Letter to Ombudsman – 8.7.03

<sup>3</sup> I shall deal below with the issue of the MOU. – para.16.55.

the task of protecting "public health from the adverse effects of exotic organisms", equally in my opinion it has the task of protecting public health from any adverse effects of the processes used to eradicate such organisms.

- 16.5 Given the terms of s.3A, I have found it surprising that when there arose an activity which was novel to New Zealand, namely the aerial spraying of many thousands of citizens, of which, by August 2002, the Minister of Biosecurity stated:

"MAF also considers that while there are significant risks to successful implementation of a large-scale the eradication programme, these are not of sufficient magnitude to warrant termination of the eradication attempt. This is despite the programme being on a scale that is unprecedented worldwide."<sup>4</sup> (My emphasis)

- the Ministry felt able to acquiesce in entrusting the care of those to be sprayed into the hands of the Ministry of Agriculture and Forestry, whose principal task was to eliminate the alien moths.<sup>5</sup> This was to be with a substance the consequences of which, in terms of human health, were then still largely unknown, and in respect of which a large number of citizens were concerned, rightly or wrongly, about present or future health effects. Before the White Spotted Tussock Moth programme commenced the Chairman of the Tussock Moth Science Panel, expressed the tentative conclusion that:

"on the basis of all the available evidence there seem to be a very low health risk, but that as the spray had not been tested on the New Zealand population, the issue became one of risk management."<sup>6</sup> (My emphasis)

- 16.6 With reference to then Director General's letter of 6 October 2003<sup>7</sup>. I consider it is questionable whether, under a statute which states the Ministry's function to be "improving promoting and protecting public health"<sup>8</sup> (which, by definition, includes "the health of a community or section of the people of New Zealand"), the Ministry may be entitled to form a view "that their task is not to 'minimise health effects'". To "minimise health effects" would seem to me to be an important sought-after outcome of the statutory function.
- 16.7 In that letter the then Director General informed me of her department's involvement, and it is desirable that I set out a substantial part of her reply:

"Your concern that the Ministry abdicated its responsibilities in favour of MAF appears to be a fundamental misunderstanding of the whole of Government approach to biosecurity in general and to the eradication programme in particular.

"The Ministry of Health's role is to protect public health. Often society chooses to take a course of action that has some negative aspects for public health but has societal benefit (economy, environment, non-health sector) such as use of motor vehicles, alcohol. The Ministry and my officials are quite clear that their task is not to 'minimise health effects' but to clearly and where possible predict them, and make that information available to society, Government and individuals to inform the choices that they make. This function is enabled by the use of

<sup>4</sup> Minister of Biosecurity's paper supporting CBC (02) 101 para.76 [Doc 21]

<sup>5</sup> Cf. para.16.50 below.

<sup>6</sup> Tussock Moth Science Panel Minutes – 1.8.96 para.12 [Doc 3B]

<sup>7</sup> [Doc 77A]

<sup>8</sup> Health Act 1956 s.3A

designated officers, who report to me, such as the Director of Public Health and Medical Officers of Health.

"In general, the Ministry does not get involved directly in local and regional issues but works through its representatives (the Medical Officers of Health and Health Protection Officers) and provides support and assistance as appropriate. The Medical Officer of Health in Auckland was fully involved in the programme from the beginning and, as you are aware, prepared the health risk assessment. The Medical Officer of Health is one of my designated officers and is my representative at a local level. Health officials also provided support, comment and assistance to MAF in the preparation of Cabinet Papers, media statements and briefings. A senior analyst attended officials' meetings and received regular reports and updates. The Director of Public Health has also made media statements, briefed and met with Ministers as required, and attend Select Committee meetings when appropriate. Our role in supporting whole of Government programmes is to provide independent and uncompromised assessment of the health effects and impacts.

"I have full confidence in the Medical Officers of Health for Auckland and I note that Dr Hope (who also manages the environmental health programme for the Auckland District Health Board) has national and international standing and credibility on environmental public health medicine issues.

"In addition, Ministry officials peer reviewed and contributed to the development of the Health Risk Assessment.

"Dr Bob Boyd, Chief Advisor Safety and Regulation, was involved, on behalf of the Ministry of Health, in advising the project team which developed and evaluated *Operation Evergreen*, the programme for spraying the White Spotted Tussock Moth. In particular, Dr Boyd peer reviewed the proposal for a health impact survey and peer reviewed the 2001 report arising from that survey. Dr Boyd has noted that he considered that the health impact survey of *Operation Evergreen* was comprehensive and well-performed by the consultants. The results have been published and Dr Boyd considered that they showed the spraying did not harm the population exposed.

"Dr Boyd was advised of the formulation of the Foray 48B used in the current spray programme in West Auckland to eliminate the Painted Apple Moth. Dr Boyd confirmed that he was aware that the active ingredient was once again *Btk*, which will carry with it, in very dilute quantities, the remains of the medium in which it was fermented. Dr Boyd noted that he had checked the other substances that make up the Foray 48B. All of the ingredients are accepted food additives and are in common use in foods, personal products (eg cosmetics) and household products (eg spray cleaning solutions). In Dr Boyd's view, there was no way that people in the community could avoid coming into contact with any or all of these substances during their daily life. Dr Boyd also saw the Health Impact Assessment performed by the Public Health Service of the Auckland District Health Board, in March 2002. He agreed with its conclusions. In Dr Boyd's view, while some people may have unpleasant symptoms associated with aerial spraying of Foray 48B, the health risk is extremely small.

"Dr Colin Tukuitonga, Director of Public Health, also reviewed the Health Risk Assessment and has publicly expressed confidence in it.

"Mr Jim Waters, Senior Advisor (Toxicology), provided the toxicological analysis and assessment during the development of the Health Risk Assessment.

"You raise concerns that the Health Risk Assessment was not formally revised to consider the potential health impacts of the increased spray zone. The Health Risk Assessment discusses the relative (ie proportional) health risks from the spraying. While the increase in the exposed population would increase

the numbers of people reporting discomfort or health effects (absolute risk), it would not change the expected impacts on a proportional basis (relative risk). I am aware that MAF have advised you of correspondence they had with the medical officer of health on this issue. The Ministry of Health supports the advice of the medical officers of health."

- 16.8 Other issues were addressed in the Director General's letter, but have ceased to have immediate relevance, apart from confirming that Ministry officials were aware that the Medical Officers of Health were being kept informed of health impacts from the spray programme reported to the health support service. This information was used to extrapolate the potential health impacts of the expanded programme. I have now been informed that there was regular interaction between MAF and the Medical Officers of Health in Auckland and Hamilton. MAF officials consulted with the Medical Officer of Health on possible implications of the programme.
- 16.9 So far as I am aware, however, the only evidence I have received of consultation between MAF officials and the Medical Officer of Health on the possible impacts on the people and communities of the greatly extended spray programme (from 900 ha with a helicopter to 12,000 ha with fixed wing aircraft carried out over some many months) comprise an exchange of e-mails on 7 August 2002<sup>9</sup>. At 2:25 p.m. on that day Mr Ian Gear, of MAF, wrote to Dr David Sinclair:

"G'dday David, In advance of the meeting we have here tomorrow I am writing to seek your opinion regarding the previously completed health impact assessment report and the applicability of that report to the proposed expanded programme. Should Cabinet determine that we are to move to the 8000 plus hectare operation is the ADHB satisfied that the report at hand addresses public health issues?....."

At 4:28 p.m. Dr Sinclair replied:

"Hello Ian  
In general, the answer would be yes. The HIA primarily identifies and assesses possible health effects, but doesn't assess possible rates of the effects on people in the previous zone. The sections on the population apply only to the original PAM operation of course, but they probably do not need revising as they are not the core sections of the report. The HIA for PAM was based on the HIA for Evergreen, which was similar magnitude to the expanded PAM operation.  
Thanks  
David Sinclair"

- 16.10 I am not sure what prior knowledge Dr Sinclair had of the expanded operation, but if it was none, then Mr Gear's intimation was sparse, and it seems surprising that Dr Sinclair did not seek to be more fully informed. The population liable to be sprayed was approximately twice that involved in the Ever Green operation, and the spraying was intended to be far more intensive, and prolonged. A similar comment applies to the increased concentration of Foray 48B to 7 l/ha applied latterly at Hamilton.
- 16.11 I have been informed now that these exchanges of e-mails followed extensive discussions between the two Ministries and the Medical Officer of Health on the implications of extending aerial operations, and that they should be read as the formal conclusion of those discussions. That may

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<sup>9</sup> Part [Doc 71B]

well be so, but I have not been directed to any other memoranda or documentation which would support those conclusions. There had been a Health Support Strategy which, amongst other material, noted that the full expansion of the spray programme would extend the catchment of the Health Support Service by 13.3 times, but there is no discussion of the implications of that. If there had indeed been extensive discussions it seems strange that Mr Gear, the Acting Director, had at that late stage to seek an answer to such a seemingly basic question. As I observe below in a different context, there is a duty to keep proper records. In their absence it remains unclear what separate consideration was given to those issues.

16.12 Arguably, the Health Risk Assessment had become an unreliable basis because of the changes which had been made to the spray programme. Paragraph 2 of the terms of reference stated:

"To assess the health risks of aerial spray programme in the painted apple moth eradication programme for MAF as follows:

- Aerial spraying one day per week, every three to four weeks, for six to eight sprays using *Btk* in the formulation Foray 48B at five litres per hectare. Spraying is to commence early 2002 and continued for up to 15 sprays in order to obtain a minimum of six effective spray applications.
- The use of twin-engine BK 117 helicopters equipped with Micronair spray equipment to deliver the aerial spraying programme"

16.13 The Introduction stated, in part:

"The area to be spray totals about 550 hectares and consists of a number of riparian areas... BK-117 helicopters will be used and spraying will be conducted as low as five metres above target vegetation in uninhabited areas. In other areas spraying will occur at 45 metres above target vegetation...

There has been extensive work to date in Auckland to assess health risks posed by aerial spraying of Foray 48 B...."

This is vastly different from what actually occurred. While it may have represented what was intended, or anticipated, in March 2002 when a relatively limited spraying exercise affecting possibly 13,000 people was envisaged, it is difficult to understand how it could have been thought to be a satisfactory basis for proceeding with a long-term intensive spraying of a population which came to number 193,000 inhabitants, together with those from outside the area who would have occasion to enter it.

## Health risks and Foray 48B

- 16.14 I return to the health issues raised when the issue of the use of Foray 48B was first considered by the Tussock Moth Science Panel. In Part 3 of this report, in paragraphs 3.10 and 3.11, I have set out a range of issues which still have relevance; some are listed below.<sup>10</sup> Paragraph 3.10 v. refers to an “*unacceptable public health risk*”. Was that point ever defined, and if so, where was it recorded? What were the gaps in previous studies referred to in sub-paragraph ix? What steps did the Ministry of Health take imperatively to “identify, monitor, and manage” effectively any potential health risks? Had those matters been addressed, it seems at least likely that the concerns which eventually arose might have been avoided or at least ameliorated.
- 16.15 An issue which has remained contentious during the PAM and AGM spray operations has been the ingredients of Foray 48B. I am, of course, aware that independent assessments of this substance were carried out by Dr Di Marco at the instance of the Waitakere City Council.
- 16.16 Reference is made in paragraph 3.11.x to some questions arising regarding the substances *methyl paraben* (which is a trade name), and benzoate, which together are more correctly called *Methyl P - Hydroxybenzoate*. I am aware that in August 2002 another substance, referred to as *proxel*, was also involved.<sup>11</sup> That was the subject of the recent information to me from ERMA mentioned above.<sup>12</sup> I see that this issue arose again at the third meeting of the PAM HAG on 14 August 2003, when the representative of the Ministry of Agriculture and Forestry agreed that there had been a change in the formulation, which had been approved by ERMA.
- 16.17 In addition to the information cited above from ERMA, I have also been provided with a copy of the material formally tabled in the House of Representatives on 10 October 2002 by Mr Ian Ewen-Street, then an MP, and claimed by him to be the formula of Foray 48B then in use.<sup>13</sup> That, so far as I can tell, has never been formally either agreed or denied by the Ministry of Agriculture and Forestry or the Ministry of Health. I note also that on 9 October 2002 the Government granted an indemnity to AgriQuality New Zealand Ltd.<sup>14</sup> I believe it is highly desirable that the questions surrounding the formulation Foray 48B should even now be resolved. I notice that so far back as the Tussock Moth Panel's deliberations it was

<sup>10</sup> By way of example only, from the Minutes of 26 July and 12 August 1996:

- Determine maximum BTK intake of the person standing outside during spraying.
- Identify health research needs, e. g. for pregnant women, chronic fatigue syndrome, etc.
- Advise Ministers that there is scientific merit in well-designed health studies, especially in light of repeated sprays.
- Health issues - inert agents in Foray 48B and possible risks (food allergies).
- Further attention to the implications of repeated exposure for increased sensitivity.

<sup>11</sup> [Doc 18AA]

<sup>12</sup> Para 15.29 et seq

<sup>13</sup> [Docs 24A and 24A2]. Neither of the above substances seems to be listed.

<sup>14</sup> “The indemnity will indemnify AgriQuality New Zealand Limited against third-party claims in respect of any chemical effects, long-term effects on health or the environment or other effects which may result in the future from the use of the Btk spray to eradicate the painted apple moth.” [Doc 24B]

suggested that such an assessment should be carried out by an allergist.<sup>15</sup> That point was also raised by Dr Meriel Watts.<sup>16</sup>

### Wellington Medical School Report

16.18 The second issue of concern has related to the Wellington Medical School report. Until the announcement on 20 March 2003, by the Ministry of a public consultation on health impacts of aerial spray, I have been unable to trace any apparent involvement of the Ministry, although I have recorded the Director General's comments on that question.<sup>17</sup> By that date most of the heavy aerial sprays had taken place. The announcement followed consideration of Hana Blackmore's report by the IESR Ltd, and was temporally associated with the other material mentioned above.<sup>18</sup>

16.19 In my Draft Report I said,

"So far, I have not been provided with any Ministerial or other papers that one might expect proposing the move to public consultation."

That continues to be the position. I have to say that I find the explanation (verbal advice) for this omission contained in the present Director General's letter to be unsatisfactory. The Ministry has a statutory duty to make and maintain proper records. That is implicit in the Official Information Act, 1982 (hence the Ombudsman's power to require public servants to search their memories where written records do not exist), and now explicit in the Public Records Act, 2005.<sup>19</sup>

16.20 The Ministry's media release stated:

"A new study by the Ministry of Health will involve widespread consultation with communities to gauge health concerns about the painted Apple Moth spraying programme... Ongoing MAF surveillance has been extremely helpful in identifying a number of health concerns. We know there are many residents out there with anxieties so it is important we listen through in-depth consultation and study background literature to establish any other health concerns, how widespread they are, if any are unique to particular groups, whether concerns can be addressed and if so how... This will be a comprehensive and objective review of the literature plus consultation. We don't want to miss any concerns. The

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<sup>15</sup> Para.3.11. i

<sup>16</sup> Para.13.22

<sup>17</sup> Para.16.7

<sup>18</sup> Para.14.6

<sup>19</sup> **"3. Purposes of Act -**

The purposes of this Act are - ...

(c) to enable the Government to be held accountable by -

(i) ensuring that full and accurate records of the affairs of central and local government are created and maintained..."

**"17. Requirement to create and maintain records**

- (1) Every public office and local authority must create and maintain full and accurate records of its affairs, in accordance with normal, prudent business practice, including the records of any matter that is contracted out to an independent contractor.
- (2) Every public office must maintain in an accessible form, so as to be able to be used for subsequent reference, all public records that are in its control, until their disposal is authorised by or under this Act or required by or under another Act...."



Ministry hopes to have a contract in place, and with the early stages of consultation underway within a month."

16.21 By 22 May 2003 negotiations with the Wellington School of Medicine were well advanced, and a timetable had been set for completion of the project by 30 September 2003.

16.22 At that time I queried the seemingly long period of two months for finalisation of the Report, as time was seen to be of the essence.

16.23 The Ministry responded to that point on 8 July 2003 stating:

"While it would be desirable to shorten the timeframe, it is difficult to give any guarantees in this respect, as we will not know how long external peer review will take or how long it would take to read draft reports particularly since we intend that stakeholders will have the opportunity to nominate peer reviewers of the report in addition to those identified by the researchers and the ministry. If it is possible to shorten the timeframe on receipt of the report from the Wellington school of medicine we will do so."

16.24 The Ministry of Health was aware by the end of July 2003 of the possibility that new aerial spray programmes might be necessary, and was hopeful that the report would be available to MAF before any such programme was launched. The Medical School was notified of this.<sup>20</sup>

16.25 In the light of that knowledge I wonder why a more rigorous timetable was not imposed, and overseen, by the Ministry.

16.26 In my letter 1 August 2003 to the complainants I referred to the proposed external peer review of the Report being prepared for the Ministry of Health. I said:

"While external review can be seen as desirable, an overly extensive process might be self-defeating. I am unsure of the extent of your involvement or influence amongst those who have opposed the spray programme, but if you are in contact with them, you might sound a note of warning in that regard."

16.27 It appears that the research teams did not commence their work until 25 August 2003, virtually one month after the peer reviews should have been completed according to the agreed timetable.

16.28 The contract was not actually signed by the University of Otago until 19 August 2003, which, according to the Ministry, was a significant cause of delay.

16.29 It is convenient to complete the history of the delayed Report before turning to the Ministry's response to the main complaint.

16.30 According to an e-mail from Simon Hales dated 16.11.03 there was a technical problem with getting digital recordings of focus groups transcribed. An additional cause of delays was the need to consult ethics committees before calling for submissions.

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<sup>20</sup> E-mail - Gilbert to Hales - 31 July 2003 [Doc 102B]

- 16.31 The review draft report was sent by the Medical School to the Ministry of Health on 17 December 2003. Earlier, there had been exchanges regarding the appointment of reviewers, but the draft was sent to Health officials and other reviewers on 5 January 2004 with a response date of 30 January 2004, although an earlier date had, somewhat optimistically, been envisaged.
- 16.32 The comments by Health officials were sent to the Medical School on 5 February 2004, and other reviewers' reports were evidently received, because by 23 February 2004 the Medical School expected to have a revised version of the report available – which, as it later transpired, it regarded as the final version.
- 16.33 In answer to my enquiry on the subject in February 2004, the Ministry said that the report was delayed (again) because of the need to ensure adequate consultation with stakeholders and community groups. The focus groups took longer than expected to arrange.
- 16.34 The E-mail goes on to state:
- "However the draft report has been prepared and has been externally peer reviewed. It is currently being redrafted to be provided to the Ministry as a final draft. I'm not sure how long this will take as the draft report did need significant work to bring it up to an acceptable standard, and it may be that the final draft we receive will require further work. The Ministry may also need to undertake another round of peer reviews as many nominated reviewers were unavailable to contribute including, for example, the two community nominated reviewers."
- 16.35 However, in the meanwhile MAF had written to the Ministry of Health expressing serious concerns about the report, and intimating that it should receive a further major review. The Ministry notified the Medical School of this, and that appears to have precipitated a quite sharp disagreement between the Medical School and the Ministry, which continued until it was settled by a teleconference on 22 April 2004.
- 16.36 The dispute was not about the contents of the report but whether or not the Medical School was obliged to provide a final report after the reviewers' comments had been incorporated. The Medical School seems to have thought that the requirement for yet further review was to satisfy MAF, and on 20 April 2004 stated to the Ministry,
- "Your intention to seek external review is for political, not scientific, reasons. We do not wish to be involved in your political conflict with MAF. As clearly stated in previous e-mails, we do not intend to revise the report in response to a further round of peer review, at least not as part of the current contract with Health."
- 16.37 In fact what occurred was that, irrespective of the views of the Medical School, the Ministry did obtain further reviews, and they were attached to the February version of the report, which for practical purposes became the final report.
- 16.38 In an internal memorandum dated 20 April 2004 a Ministry official stated:
- "We identified significant gaps in the reviewers including community-nominated reviewers, toxicologists and those not associated with local or central government agencies. The letter from MAF has no bearing at all on the suggestion for further

peer review but has (coincidentally) identified concerns consistent with our previously advised concerns."

16.39 On 20 April 2004 the Ministry informed me that there were several reasons for the delay before the Ministry received a copy of the report. The letter continues:

"The Ministry is of the view that the draft report is not well written and does not address the issues that the School of Medicine was contracted to do. The availability of peer reviewers has been a problem, which has delayed the Ministry finalising its comments on the draft report. The release of the draft report to the media has however placed a different dimension on the release of the report. The Ministry will be taking all possible steps to release the draft report this week notwithstanding that we have concerns about the report".

16.40 A copy of the report had been leaked to the *Sunday Star Times* on 17 April 2004.

16.41 Mr Simon Hales, in his e-mail 14 May 2004, stated:

"Our scientific concerns (in the form of a draft literature review) were made available to MOH in September 2003, and again in more complete form in December, with a recommendation that they be passed on to the Minister. From that time on, it is my perception that MOH began dragging their feet. The number of proposed reviewers was approximately doubled, after consultation between MOH and MAF. MOH then requested that the review be delayed until after the New Year.

"We subsequently extended the review period due to lack of response from potential reviewers. A draft report was sent to review in early January. Comments were eventually received (from those reviewers who agreed to take part) by mid-February. We met one reviewer face-to-face to discuss his concerns and revised the report for resubmission."

16.42 Having regard to the urgency, and potential importance, of the findings of this report, there seems to have been a remarkable absence of urgency by those principally involved.

### **Devolution of Ministry's Functions**

16.43 In addition to the issues raised directly by the complainants, it appeared to me that there was an issue as to whether the Ministry of Health, given the terms of section 3A cited at para 16.1 above,<sup>21</sup> could as a matter of law seemingly delegate one of its central functions effectively to MAF. I now accept that there was no formal delegation, but the Ministry appears often to have been at least at one remove from being fully in control of health-related operations and strategy.

16.44 The Ministry has provided me with a copy of the opinion of the Crown Law Office (Ms U Jagose, Crown Counsel)<sup>22</sup> which I have found very helpful even though Crown Counsel does not agree with some aspects of the provisional view which I had expressed.

<sup>21</sup> "Without limiting any other enactment or rule of law, and without limiting any other functions of the Ministry or of any other person or body, the Ministry shall have the function of improving, promoting, and protecting public health."

<sup>22</sup> Crown Law Office opinion 20. 6.07 - [Doc 135A]

- 16.45 However, I do not think that for the purposes of this Report it is necessary for me to enter into debate about the precise meaning to be attached to "functions" in the portion of section 3A of the Health Act I have cited above. It is a word which is capable of encompassing both mandatory duties and discretionary powers. I prefer to lean towards the notion of a duty (even though Crown Counsel does not see it in that light) in part because of the sheer importance of the task, and because whether one regards the function as a mandatory duty or a discretionary power, there still has to be an element of discretion in the way in which the task is carried out.
- 16.46 As I have indicated above, this was a unique situation. It involved, by New Zealand standards (and indeed by world standards), a very large number of people, and while in other circumstances it may have been sufficient to follow the Ministry's usual practice of operating through the Medical Officer of Health for the relevant area, it remains my opinion that both the magnitude, and the unique nature, of the operation demanded a much closer involvement by the senior staff of the Ministry than the information supplied to me indicates.
- 16.47 By comparison, I note that MAF regarded the spray operation as a national initiative, so justifying the use of section 7A of the Biosecurity Act, rather than a local issue to be left to local authorities to be dealt with in accordance with the Resource Management Act.
- 16.48 I, of course, accept that by the time the PAM programme was established Foray 48B had, to quote the words of the chairman of the TMS panel "been tested on the New Zealand population". However, the New Zealand population does not have a constant content; there are demographic differences and with them come health susceptibilities, about which, in relation to West Auckland and to some degree Hamilton, we now have a significant amount of information. However, I venture to suggest that if a similar operation were to be carried out in relation to, say, Tauranga (with its many retirees) or Rotorua (with its large Maori population), a properly conducted health assessment might show that the outcomes, in terms of human health, could be significantly different.
- 16.49 In that respect the IESR Ltd Study<sup>23</sup> is of interest, although it is confined to respiratory conditions of sufficient severity to require admission to hospital. In relation to children aged under 14 years, there was statistically significant data showing up to doubling of the discharge rates for boys aged 0 to 4 years old, with lesser increases in other age and gender categories. While acknowledging, and examining, the possibilities that chance, bias, and confounding may be alternative explanations, the Study concludes with the statement;
- "However, there are several findings indicating a real increase in asthma discharges that could plausibly be associated with the spray programme."
- 16.50 Consequently, while I accept that memoranda of understanding can be useful tools in achieving whole of government outcomes, they may create

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<sup>23</sup> *Descriptive Study of Hospital Discharges for Respiratory Diseases in spray zone for Painted Apple Moth (Auckland), relative to local and national statistics 1999-2004* – Gallagher, Pirie and Hales – 29.9.2005 [Doc MAF 6]

a perception of conflict of interest. The main focus of the operation was to kill off the relevant pest. That was MAF's function. However, there are human health issues that arise from that process. Public confidence will be put at risk if these issues are not addressed by an agency which is demonstrably separate from that directly engaged in the eradication process.

- 16.51 I believe that for future aerial spray programmes which are to be carried out over heavily populated areas it is very desirable that the Ministry should appoint a senior official within its head office structure 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.
- 16.52 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.
- 16.53 The Ministries have reminded me on a number of occasions to note that the health consequences about which complaint has been made have been those foreshadowed in the relevant Health Risk Assessments, and indeed have been recorded in the community based reports to which reference has already been made. It seems to me that that coincidence of events cannot be put to one side, and that it raises a probability (although I accept not a certainty) that the spray programme is at least a likely cause of the conditions in question.

### **Memorandum of Understanding**

- 16.54 I had also expressed some concern that this devolution of authority to MAF appears to have continued under a series of Memoranda of Understanding entered into subsequent to the completion of the spray programmes.
- 16.55 The Ministry informed me:
- "MAF, the Ministry of Health, the Ministry of Fisheries and the Department of Conservation have a Memorandum of Understanding that clarifies the agencies' responsibilities under the Biosecurity Act. The Ministry of Health's responsibilities in terms of the MOU are to provide advice to Government on all matters relating to human health; and to administer and implement a variety of health-related legislation. For the purposes of the Biosecurity Act 1993, the Ministry of Health's priority is to enforce the relevant provisions of the legislation so as to protect public health from the adverse effects of exotic organisms."
- 16.56 The first such Memorandum<sup>24</sup> appears to have come into existence in March 2002. The most recent is the Memorandum dated 31 October 2006<sup>25</sup>.

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<sup>24</sup> [Doc 109A]

<sup>25</sup> [Doc 134]

- 16.57 It seems that prior to the 2002 Memorandum there had been no formal arrangement between the various agencies primarily involved. There were, however, Biosecurity Council Policy Statements which may have had the effect of a MoU, since the Ministry of Health and MAF were on the Council.<sup>26</sup>
- 16.58 Reference to the 2006 document shows that the desired outcomes included that biosecurity contribute to:
- "People-Healthy New Zealanders...  
Reduced impacts on human health and wellness from biosecurity pests and pest management activities"
- 16.59 In its response to my Final Draft Report the Ministry has referred me to two briefings to the Director General of 1 May 2003 and July 2003. At the earlier date these tend to show that there was some disquiet on the part of the then Director of Public Health regarding the stability, quality and quantity of surveillance and monitoring mechanisms then in place, but which were resolved two months later. I feel obliged to express my surprise that at this stage of my investigation these two memoranda have been introduced despite my earlier request for all relevant information to be provided. While they are of interest, the substantial spray operations were largely completed by July 2003, and as with the setting up of the investigation by the Wellington School of Medicine, I am left with the feeling that this activity was too late to be effective, or to increase or establish public confidence.

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<sup>26</sup> Ministry's letter of 7 March 2007

## 17. Exemption from Part 3 of the Resource Management Act

- 17.1 From the beginning of Operation Ever Green it was apparent to the Government that the use of sprays on a large scale, and particularly aerial sprays, would present difficulties in relation to compliance with the Resource Management Act. Under section 15 of that Act it is an offence to discharge any contaminants into the environment unless the discharge is expressly allowed by a rule in the regional plan and any relevant proposed regional plan, a resource consent, or by regulations.
- 17.2 It was perceived that there was the potential for operations to be delayed or perhaps even prevented by resort to the provisions for objections by persons affected which arise under that Act.
- 17.3 In relation to Operation Ever Green this was met by regulations made under the Resource Management Act<sup>1</sup> specifically directed to the use of the biological insecticide *Btk*, whether discharged at ground level or from an aircraft, but in the case of aerial spraying the joint written authorisations of the Ministers of Forestry, Health, and Conservation were required. Those regulations came into force on 29 August 1996, and appear not to have been revoked.
- 17.4 It was apparently considered that a more flexible process was desirable. In 1997 a new section 7A was added to the Biosecurity Act 1993 (with effect from 26 November 1997) exempting from Part 3 of the Resource Management Act actions under Part 6 of the Biosecurity Act so that the responsible Minister, if satisfied of the existence of certain threshold matters stated in section 7A(1), could exempt the proposed eradication process for a period of 20 working days. On the expiration of that time regulations could be made extending the period of the exemption for up to two years. I cite below subss.(1) and (2) of this quite lengthy provision.<sup>2</sup>

<sup>1</sup> Resource Management (Exemption) Regulations 1996 SR 1996/238

<sup>2</sup>“(1) Where any action taken in accordance with any provision in Part 6 of this Act in an attempt to eradicate any organism would be in breach of the provisions of Part 3 of the Resource Management Act 1991, the responsible Minister may exempt the actions taken in relation to that organism from the provisions of Part 3 of the Resource Management Act 1991 for up to 20 working days if that Minister is satisfied that it is likely that -

- (a) The organism is not established in New Zealand, the organism is not known to be established in New Zealand, or the organism is established in New Zealand but is restricted to certain parts of New Zealand; and
  - (b) The organism has the potential to cause all or any of significant economic loss, significant adverse effects on human health, or significant environmental loss if it becomes established in New Zealand or if it becomes established throughout New Zealand; and
  - (c) It is in the public interest that action be taken immediately in an attempt to eradicate the organism.
- (2) Before making a decision under subsection (1), the responsible Minister must consult the relevant consent authority (to the extent that is possible in the circumstances), and may consult such other persons as the responsible Minister considers are representative of the persons likely to be affected by the eradication attempt...” – Biosecurity Act 1993.s.7A

- 17.5 That was the process applied in relation to the West Auckland PAM eradication programme<sup>3</sup> and also that carried out in Hamilton against the Asian Gypsy Moth.<sup>4</sup>
- 17.6 As the exemptions created under section 7A override the statutory rights of objection which citizens might otherwise be entitled to invoke, it is important that the procedural steps under that section are strictly observed. That appears to have been so in the case of the three exemptions which I have considered.
- 17.7 While one can understand the administrative convenience that the procedure under section 7A provides, it is no small thing to remove, albeit temporarily, important rights for the public to intervene in a process which may have unwanted and potentially significant consequences for them. The Biosecurity Act in Part 7 makes detailed provision for dealing with biosecurity emergency situations. Those powers were not used in these cases.
- 17.8 The White Spotted Tussock Moth was detected in April 1996, but action did not commence against it until October 1996. The Painted Apple Moth was discovered in May 1999, and while there was some earlier ground spraying, aerial spraying did not commence until January 2002. An Asian Gypsy Moth in Hamilton was found in March 2003, yet aerial spraying did not commence until October 2003. Therefore, in none of those cases does there appear to have been such urgency that there could not have been room for some independent assessment of the environmental impact of what was proposed. It is worth recording that the statutory definition of "Environment" expressly includes people and communities.<sup>5</sup>

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<sup>3</sup> Biosecurity (Resource Management Act Exemption) Regulations 2002 SR 2002/7; Biosecurity (Resource Management Act Exemption) Regulations (No 2) 2003 SR 2003/344.

<sup>4</sup> Biosecurity (Resource Management Act Exemption) Regulations 2003 SR 2003/271.

<sup>5</sup> "Environment" includes -

- (a) Ecosystems and their constituent parts including people and communities; and
- (b) All natural and physical resources; and
- (c) Those physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes; and
- (d) The social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) of this definition or which are affected by those matters:" - Environment Act 1986 s.2.



- 17.9 I have recently been referred to two Environmental Impact Assessments, one dated February 2003 relating to West Auckland<sup>6</sup>, and the other, dated October 2003, as a supplement to the earlier document but in relation to Hamilton<sup>7</sup>. They both suffer from the disadvantage of having only become available after the spray programmes had been put in place and were operational. I remain of the view that there ought to be a "fast-track" procedure which would enable an application to the Environment Court, whose decision should be final.
- 17.10 I note that while the regulations in question have expired, others, in relation to other areas, continue in force.

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<sup>6</sup> *"Environmental Impact Assessment of Aerial spraying Btk in NZ for painted apple moth"* – Biosecurity New Zealand – February 2003 – **[Doc MAF 4]**

<sup>7</sup> *"Appendix to the Painted Apple Moth Environmental Impact Assessment – Eradication of gypsy moth from Hamilton"* – T.R Glare – October 2003 – **[Doc MAF 5]**

**APPENDIX 2****LIST OF MATERIAL CONSULTED (OTHER THAN CORRESPONDENCE WITH COMPLAINANTS AND MINISTRIES)**

| <b>No</b>  | <b>Date</b>              | <b>Title</b>  | <b>Author</b>   |
|------------|--------------------------|---|---|
|            | <b>Pre - 2002</b>        |   |   |
| 2          | 31.3.93                  | Information submitted to British Columbia Environmental Appeal Bd   | Agriculture Canada  |
| 3          | 31.7.95                  | "Our case against Moth Spraying"  | Society Targeting the use of Pesticides (British Columbia)                                |
| 3AA        | 16.5.96<br>2.9.97        | - Cabinet papers re OEG.  | Biosecurity   |
| 3B         | 12.7.96<br>4.2.97        | - Minutes of Tussock Moth Science Panel   | .   |
| 4AAA<br>4A | 26.8.96 - 2003<br>4.9.96 | RMA Exemption Regulations<br>Health Risk Assessment - White-Spotted Tussock Moth in Eastern Suburbs - report to Ministry of Health and Ministry of Forestry | Auckland Healthcare and Jenner Consultants Ltd  |
| 4AA        | 26.9.96                  | Addendum to above.  | As above  |
| 4AB        | 30.3.97                  | Pest incursion management   | Tussock moth review panel (Sinclair, Walker and Frampton)                                 |
| 4B         | 30.7.97                  | "Vale of fears"   | North & South magazine  |
| 5          | 30.9.97                  | Health Risk Assessment-proposed 1997-98 spray programme White-Spotted Tussock Moth in Eastern Suburbs - report to Ministry of Forestry                      | Public Health Protection Service, Auckland Healthcare Services Ltd                        |
| 7          | 30.10.97                 | Report to The Treasury - white spotted tussock Moth - cost benefit analysis of eradication  | NZ Institute of Economic Research   |
| 8          | 1.1.98                   | Clarification of issues raised in "Our case against Moth Spraying"  | Jenner Consultants Ltd – now Aer'aqua Medicine Ltd (Dr Francesca Kelly (formerly Jenner)) |
| 9          | 1.1.98                   | Lab Assessment of Btk on caterpillars   | Peacock and others – Environmental Entomology   |
| 9AAA       | 24.6.98                  | Cabinet economic committee paper ECO (98) M 16/3  | MAF   |
| 9AB        | 1.3.99                   | Recognition & Management of Pesticide Poisons 5th ed  | USEPA   |
| 9C         | 1.7.00                   | Cabinet paper to support additional funding – proposal to establish operational plan for 1.7.00 – 30.6.02   |   |
| 9DD        | 0.4.01                   | Environmental and health impacts of Spinosal  | O'Callaghan and T Glare   |
| 10A        | 29.5.01                  | Cabinet Finance etc. Comm. directed MAF to report back by 33.11.01 on preferred options for management of PAM   |   |
| 11         | 30.5.01                  | Health surveillance following Operation Ever Green-report to M. A. F.   | Aer'aqua Medicine Ltd   |
| 13A        | 30.10.01                 | Government response to the incursion of Painted Apple Moth  | Minister of Biosecurity   |
| 14         | 22.11.01                 | Briefing to DG, MAF   | Director, Forest Biosecurity, MAF   |
| 14A        | 5.12.01                  | Briefing to Minister of Biosecurity   | DG, MAF   |
| 14AA       | 6.12.01                  | Memo to PM  | MAF   |
|            | <b>2002</b>              |   |   |
| 16         | 30.3.02                  | Health risk Assessment - 2002 – Western Subs  | Public Health Service, Auckland D. H. B.  |
| 17         | 7.5.02                   | Re-assessment of potential economic impacts   | M. A. F.  |
| 17A        | 28.6.02                  | CBC Paper CBC (02) 80 – attached CAB (02) 315 and supporting memorandum from Minister of Biosecurity  | MAF   |
| 17B        | 28.6.02                  | Briefing paper to Minister  | MAF   |

| No             | Date                      | Title   | Author  |
|----------------|---------------------------|---|---|
| 17C            | 3.7.02                    | Minute-CBC Min (02) 5/1   | MAF   |
| 18             | 30.7.02                   | Expected persistence and effects of Btk. biopesticide sprays in the West Auckland environment   | J. R. Gribben - BioDiscovery New Zealand Ltd/University of Auckland     |
| 18AB           | 12.8.02                   | Correspondence >MAF   | ERMA }  |
| 18AA           | 13.8.02                   | E-mail to Rath ( Valent)  | Ian Gear }  |
| 18A            | 28.8.02<br>23.8.02        | CBC Min (02) 7/1 Cabinet Paper – Govt response etc extending to 8000 – 12000 ha., and about 160,000 residents. Cabinet decision in favour of full eradication |   |
| 19             | 30.8.02                   | Health Support Strategy   | MAF Biosecurity   |
| 20             | 31.7.02<br>30.9.02        | - Reflections by project manager  | Karl Check  |
| 21             | <28.8.02                  | “Government Response to the Incursion...”   | Minister of Biosecurity   |
| 22             | 30.9.02                   | Evaluation of the Painted Apple Moth area for spray application program to August 2002  | NZ Forest Research Institute Ltd  |
| 23             | 21.1.02-<br>30.9.03       | Details of aerial spray operations  | MAF Biosecurity   |
| 24A &<br>24A/2 | 10.10.02                  | Foray 48B formula tabled in the H. of R. Greens publicity   | Ian Ewen-Street (then MP)   |
| 24B            | 16.2.02                   | Government indemnity - 9.10.02  | Green party   |
| 26             | 14.11.02                  | Application to import a hazardous substance-Bactur 48 LC  | ERMA decision   |
| 27             | 30.11.02                  | Leaflet-information to schools  | PA.M. Health Service  |
| 28 &<br>28A    | 30 11.02                  | Painted Apple Moth zone survey results  | Venture Research  |
| 29             | 30.11.02                  | Case Study 3 – Response to Incursion of PAM   | C & AG  |
| 31             | 20.12.02                  | Legal Opinion to MAF  | CLO   |
| 32             | 20.12.02 (and<br>earlier) | Departmental submissions to Minister of Conservation  | Department of Conservation  |
| 33             | 20.12.02                  | Letter to CAA – low-flying spray planes   | Zelda Wynn  |
| 34             | 24.12.02                  | Opinion to Jane Schaverien  | Sir Geoffrey Palmer   |
| 35             | 27.12.02                  | Letter to residents   | MAF   |
| 37             | 1.1.03                    | “Challenging Science”   | Kevin Dew and others  |
| 38             | 10.1 .03                  | Painted Apple Moth-health risks and effects + CV  | Dr Meriel Watts Ph.D  |
| 39             | 24.1.03                   | Letter to WCC   | MAF   |
| 40             | 15.2.03                   | Amended formula for Foray 48B in use – said to contain another chemical sensitiser.-  | JS 13.5.03  |
| 41             | 28.2.03                   | Environmental Impact Assessment   | MAF Biosecurity   |
| 42             | 28.2.03                   | Terms of reference for Science and Technical Advisory Group   | MAF Biosecurity   |
| 43             | 15.2.03                   | Interim report community-based health incidents -January/December 2002 + CV   | Hana Blackmore  |
| 44             | 28.2.03                   | West Auckland aerial spraying survey  | NZEI  |
| 45             | 3.3.03                    | Letter > WCC  | Dr Sinclair   |
| 46             | 14.3.03                   | Symptom complaints following aerial spraying with biological insecticide Foray 48B  | Petrie, Thomas & Broadbent<br>NZMJ Vol.116 No.1170<br>University of Akd |
| 47             | 30.3.03                   | Health Monitoring Strategy-draft  | MAF Biosecurity   |
| 48             | 8.4.03                    | Health report to Minister-review of Hana Blackmore’s report   | Ministry of Health  |
| 48 A           | Post February<br>2003     | Report to MoH on Hanna Blackmore’s paper  | Dr David Phillips, ESR  |
| 49             | As at<br>9.4.03           | Terms of Reference for Operational Health Group   | MAF Biosecurity   |
| 50 50A         | 30.4.03                   | Painted Apple Moth zone survey results for MAF  | Venture Research  |
|                | <b>Box 2</b>              |   |   |
| 51             | 30.4.03                   | Review of M. Watts’s paper for MoH  | Dr Deborah Read   |

| <b>No</b>  | <b>Date</b>                             | <b>Title</b>  | <b>Author</b>  |
|------------|---|---|--|
| 52         | 1.5.03                                  | Agreement-HMQ and Wellington School of Medicine   | Ministry of Health   |
| 53         | 7.5.03                                  | Letter & attachments to Max Wilde, Waitakere CC   | Meriel Watts   |
| 54         | 14.5.03                                 | Email > WCC   | Dr Sinclair  |
| 55 and 55A | 21.5.03                                 | Minute and associated report: review of eradication programme-EDC Min (03) 11/1   | Minister of Biosecurity and Cabinet Economic Development Committee |
| 56         | 26.5.03                                 | Minute: Cabinet-CAB Min (03) 18/5   | Cabinet  |
| 57         | 28.5.03                                 | Minutes   | Health Advisory Group  |
| 58         | 5.6.03                                  | Potential for aerosol dissemination of Biological Weapons: Lessons from Biological Control of Insects   | David B Levin - Medscape   |
| 59         | 10.6.03                                 | Complaint to Advertising Standards Authy & Decision   | H Blackmore  |
| 59A        | 17.6.03                                 | Minutes if AGM TAG meeting  | MAF  |
| 60         | 19.6.03                                 | PAM. Health Service Monthly Reporting January-May 2003  | MAF Biosecurity  |
| 61         | 30.6.03                                 | Key Documentation: PAM Project Team   | MAF  |
| 62         | 30.6.03                                 | Terms of Reference for Health Advisory Group (HAG)  | MAF Biosecurity  |
| 63         | 30.6.03                                 | Operations Procedure for Practical Support-draft  | MAF Biosecurity  |
| 63A        | 1.7.03                                  | Annual report – p.35 - non quantifiable contingent liability-indemnity-harmful effects of Btk spray   | MAF  |
| 64         | 2.7.03 H                                | Agenda and Minutes – Managing Health Issues   | Inter-departmental mtg @ Wgton                                     |
| 65         | 4.7.03 and 14.8.03, 24.10.03 and 2.2.04 | Minutes see also document 57  | Health Advisory Group  |
| 66         | 10.7.03                                 | Letter > WCC  | Dr Sinclair MOH, Akd   |
| 67         | 14.7.03                                 | Operational strategy V7.3   | MAF Biosecurity  |
| 67A        | 28.7.03                                 | Media release-PAM medical report  | MOH  |
| 67AA       | 08.03                                   | PAM – Whats at stake  | MAF  |
| 69         | 22.8.03                                 | As for 67A  |  |
| 70         | 2.9.03                                  | Questions and answers   | MAF  |
| 71 (pt.1)  | 8.9.03 H                                | Cabinet Minute CAB Min (03) 30/10 and associated papers   | Minister of Biosecurity  |
| 71 (pt.2)  | 8.9.03 H                                | Application to Minister of Biosecurity to use s.7A of the Biosecurity Act to avoid Pt III of RMA. The appropriate approval was of course given. |  |
| 71AA       | 17.9.03                                 | Media release etc as for 67A  |  |
| 73         | 30.9.03 H                               | E-mail communications   | KR/Ian Gear  |
| 74         | 1.10.03 H                               | Human health Considerations – AGM - Hamilton. See document 82   | MoH, MAF, & Waikato DHB Public health Unit                         |
| 75         | 1.10.03 ? H                             | Booklet – Info about AGM in Hamilton  | MAF Biosecurity  |
| 79         | 10.10.03                                | Aerial map – spraying areas – W Akd   | NZ Herald  |
| 80         | 10.10.03                                | Spraying ops  | NZ Herald  |
| 81         | 1.1.02 – 11.10.03                       | Diary of aerial spraying – W. Auckland  | Sally Lewis  |
| 82         | 13.10.03 H                              | HRA available to this Office  |  |
| 84         | 14.10.03 H                              | Newspaper report of Hamilton's spraying   | Dominion Post 15.9.03, and NZ Herald of 10.10.03                   |
| 85         | 15.10.03                                | Email to Gear and others  | P Di Marco   |
| 86         | 22.10.03                                | Letter to ACVM Group  | Director Forest Biosecurity  |
| 87         | 29.10.03 H                              | Judgment of Potter J  | HC, Hamilton   |
| 87A        | 13.10.03 H                              | Report to Hamilton City Council on Foray 48B  | Dr P n Di Marco  |
| 88         | 31.10.03                                | Record of consultations-MoH. and MAF - 9.11.01/19.11.02   | MAF Biosecurity  |
| 89         | 3.11.03                                 | Letter > OMS  | Dr Sinclair  |
| 93         | 25.11.03 H                              | Final Report – Hamilton's Fraser Boys HS  | OSH  |
| 94         | 1.12.03 ?                               | Organisational Chart  | MAF  |
| 94A        | 1.12.03                                 | Public opinion survey for MAF   | Venture Research   |

| No       | Date                        | Title   | Author                                |
|----------|-----------------------------|---|---------------------------------------|
|          | <b>2004</b>                 |   |                                       |
| 95       | 31.1.04                     | Health monitoring strategy  | MAF Biosecurity                       |
| 96       | 28.2.04                     | Assessment of potential health impacts of PAM. spraying, Auckland .> Ministry of Health   | Wellington School of Medicine         |
| 97       | 28.2.04                     | Terms of reference for self presented health concerns   | MAF Biosecurity                       |
| 98       | 28.2.04                     | Terms of reference for community survey   | MAF Biosecurity                       |
| 99       | 23.3.04                     | Report to ACVM  | Travis Glare                          |
| 99A      | 1.4.04                      | Public opinion survey for MAF   | Venture Research                      |
| 101      | 23 & 26.4.04                | Peer Reviews of WSM report  | Dr D Campbell and others              |
| 102      | 27.4.04                     | Bundle containing communications between Health officials and Wellington School of Medicine team  | Ministry of Health                    |
| 102A     | 19.8.03                     | Agreement – HMQ and WSM   | MOH                                   |
| 102B     | 31.7.03 ?                   | E-mail to WSM - mentions further spraying   | MOH                                   |
| 102C     | May/July 2003 ?             | E-mails   | MoH                                   |
| 102D     | February 2004               | E-mails   | MAF/WMS                               |
| 102DD    | 0.2.04 and later report     | Research reports (residents' perceptions)   | Venture Research                      |
| 102 DD/1 | Undated (but post May 2004) | PAM Campaign Communications – Research Report   | Venture Research Ltd                  |
| 102E     | 26.4.04                     | Report to Minister of health  | MOH                                   |
| 103      | 3.5.04                      | Provisional view – WCC acted reasonably in not prosecuting for nuisance   | OMS                                   |
| 103A     | 13.5.04                     | Answers to Parliamentary questions  | Marian Hobbs                          |
| 103AA    | 13.5.04                     | Letter to OMS   | Simon Hales                           |
| 103AB    | 20.5.04                     | Letter to OMS   | Professor A Woodward                  |
| 104      | 8.6.04                      | Hazardous substances legislation  | Stephen Parker                        |
| 104AA    | 13.6.04                     | Report - literature review etc  | Public health intelligence unit – MOH |
| 104A     | 2.7.04                      | Email – toxicologist or environmental health scientist  | JS and Dr Meriel Watts                |
| 104AA    | July 04                     | Medicine Regulations and Medsafe  | 50181/2                               |
| 105      | 4.7.04                      | “Spray family was abandoned”  | Sunday Star Times                     |
| 105AA    | 5.7.04                      | Cabinet minute CAB Min (04)22/4A  | Biosecurity                           |
| 105 AA/2 |                             | EDC Paper   | Minister                              |
| 105 AA/3 |                             | EDC Paper   | Minister                              |
| 105B     | 26/20 8.7.04                | Cabinet EDC Report (Hamilton)   |                                       |
| 106      | 31.7.04                     | Agreement for sale and purchase of Services - health monitoring studies - H. M. Q. and AgriQuality Ltd  | MAF Biosecurity                       |
| 106A     | 6.8.04                      | Letter re HAG etc   | MAF                                   |
| 107      | 30.8.04                     | “Bug-fuelled Biohazards”  | Investigate                           |
| 108      | 2.9.04                      | Letter > Mumby  | MAF                                   |
| 109      | 3.9.04                      | Report on plasmid profiles  | Prof C Guertin                        |
| 109A     | 14.10.04                    | Memorandum of understanding   | MAF and others                        |
| 110      | 5.11.04                     | Study of presentations of householder concerns to the PAM. Health Service and Auckland Summer Symptom Survey > AgriQuality Ltd DRAFT For final versions – see below June 2005 | Aeraqua Medical Services Ltd          |
| 111      | 5.11.04                     | As above - Appendices A-K DRAFT   | Aeraqua Medical Services Ltd          |
| 112      | 29.11.04                    | Study of presentations of householder concerns to AGM (Asian Gypsy Moth) Health Service - Appendices: > AgriQuality Ltd DRAFT   | Aeraqua Medical Services Ltd          |
| 113      | 29.11.04                    | Study of presentations of householder concerns to AGM (Asian Gypsy Moth)  | Aeraqua Medical Services Ltd          |

| No     | Date                | Title  | Author  |
|--------|---------------------|--|---|
|        |                     | Health Service > AgriQuality Ltd DRAFT   |   |
|        |                     | <b>2005</b>  |   |
| 114    | 1.1.05              | Video recording  | TVNZ  |
| 114A   | 1.1.05              | Worries created by pest spraying   | Petrie and others. Psychometric Medicine 67: 778 – 782 (2005) |
| 116    | 24.2.05             | Proposal to release Btk on to reserve land   | Department of Conservation                                    |
| 117A   | Mch – Aug 2005      | Correspondence re MND  |   |
| 118    | 10.3.05             | Memo re Foray 48B (and attached docs)  | Bruce Taylor, Comm. for Environment                           |
| 119    | 10.5.05             | Painted Apple Moth found in Otahuhu  | NZPA  |
| 119A   | 29.6.05             | Media release - final medical report-as for 67A  | MOH   |
| 120    | 30.6.05             | Study of presentations of householder concerns to the PAM. Health Service and Auckland Summer Symptom Survey > AgriQuality Ltd               | Aeraqua Medical Services Ltd                                  |
| 120A   | 30.6.05             | Comparison of sickness in relation to PAM and AGM  | Ditto   |
| 121    | 30.6.05             | As above - Appendices  | Aeraqua Medical Services Ltd                                  |
| 122    | 3.7.05              | TV transcript - "Sunday"   | TV 3  |
| 123    | 5.7.05              | Departmental submission to Minister of Conservation - five-year contingency approval   | Department of Conservation                                    |
|        |                     | <b>Box 5</b>   |   |
| 126    | 9.11.05             | Moth spray linked to rise in asthma cases  | Dominion Post   |
| 126A   | 25.11.05            | "Peoples' Inquiry into Aerial Spraying"  | At Akd  |
| 126b   | 25.11.05            | DVD – Evidence   | Sally Lewis   |
| 127    | 12.2.06             | Report on assessment of health effects of aerial spraying- Foray 48B - including assessment of Individual Inert Ingredients - > Waitakere CC | Benchmark Toxicology Services Pty Ltd (Peter Di Marco)        |
| 128    | 21-23.3.06          | Media reports - Di Marco report  | Various   |
| 130    | 21.3.06             | Memo on regulatory context   | MAF   |
| 132    |                     | Biosecurity exemption regulations  | MAF   |
| 133    | 06                  | Statutory declaration  | Sally Lewis   |
| 134    | 31. 10.06           | Memorandum of understanding  | MAF, Health and others  |
| 136    | 30.7.07             | Allergy NZ   | Allergy NZ  |
| 137    | 6.9.07              | Letter to OMS  | ERMA  |
|        |                     | <b>MAF SERIES</b>  |   |
| MAF 1  | 01 - 12.02          | Aerial operations technical issues   | MAF   |
| MAF 2  | 06.04               | Report - literature review - health impacts and methodologies  | Public Health Intelligence Unit                               |
| MAF 3  | 06.06               | Environmental and health impacts   | Frampton and others   |
| MAF 3A | 07.06               | Overarching Report - population health impacts   | Public Health Intelligence Unit                               |
| MAF 4  | October 2003        | Appendix to the PAM Environmental Impact Assessment  | TR Glare  |
| MAF5   | 02.03               | Environmental Impact Assessment of aerial spraying Btk in NZ for PAM   | Biosecurity New Zealand                                       |
| MAF 6  | 29.9.05             | Descriptive Study of Hospital Discharges for Respiratory Diseases etc  | IESR Ltd  |
| MAF 7  | 2002                | Leaflet-wiped out moths  | MAF   |
| MAF 8  | 13.4.03-17.6.03 (H) | AGM TAG minutes  | MAF   |