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**Open letter to all parents, schools and childcare establishments in the Painted Apple Moth aerial spraying zone in West Auckland**

In February 2002 we sent an urgent letter and detailed report about the aerial spraying programme to all schools and childcare establishments in the 600 hectare aerial spray zone, expressing our concern about the safety of children during spraying.

The Society Targeting Overuse of Pesticides NZ (STOP) and the Painted Apple Moth Community Coalition (CC-PAM) believed it was vital that no child should be exposed to the amount of spray that would be present in and around schools if aerial spraying was undertaken on a school day.

Our experience from the Tussock Moth campaign in the Eastern Suburbs in 1996/7 and updated information obtained from international reports and studies, led us to the conclusion that schools in the spray or drift zone should be evacuated or closed on spray days. Today, nine months and ten aerial sprays later, including the October 23rd operation over 8,000 hectares, nothing has changed.

Government, MAF and Public Health, have all ignored repeated requests for prudent and responsible action to protect our children.

- Closure or evacuation has been rejected in spite of re-location facilities being offered outside the spray zone.
- Active research and sampling into spray penetration and persistence in schools so that methods of protecting, venting and cleaning buildings can be carried out, have been rejected at best and unanswered at worst.
- Official Public Health advice not to spray children on their way to school has been broken on every term-time spray day, and even minimal advice for pupil protection has been ignored.

The physiology and lifestyle of all children make them far more vulnerable than adults to any pesticide. Whilst parents can ensure their individual child is safe by withdrawing them from school and removing them from the spray zone, the school also has a responsibility to protect the whole student body in what will be an 'at risk' environment.

With an eradication campaign that could continue for another three years, the issues MUST be addressed now. We ask that our case, detailed in the updated report attached, is considered as a matter of urgency.

For CC-PAM

Hana Blackmore
Meriel Watts PhD
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## INTRODUCTION

The eradication campaign against the Painted Apple Moth (PAM) is the most intensive and extensive aerial spraying programme ever proposed or conducted anywhere in the world.

Whilst overseas operations rarely extend beyond one annual three day spray conducted before 7.30am, the PAM campaign could result in a three year programme of daytime sprays every two or three weeks. This would equate to over sixty aerial exposures for pupils at school, not including any ground sprays or additional home exposure.

In this circumstance the chronic, long-term build-up of spray residue both within and outside school that our children will be subjected to, is of prime concern. Methods of protecting schools and pupil's health must be actively evaluated, considered and implemented.

When all the risks of this eradication programme as outlined in this report are considered without prejudice, the only option may be to halt all aerial sprays.

## SUMMARY

- The blanket aerial spray programme of a large area of West Auckland poses risks and hazards to the children in the school communities in the spray zone.

- The possible level of pesticide exposure has been seriously underestimated or misrepresented, and the consequential potential for adverse effects not considered, acknowledged or investigated.

- MAF's advice, and aerial spray plans, will not protect children either in the school or on the streets on their way to or from school.

- It has been acknowledged by Public Health that it is very difficult, if not impossible, to conclusively prove the spray programme is either safe or unsafe.

- Considering the level of risk we will outline in this report, the precautionary principle must be applied. Either all schools and establishments taking children within the spray zone should be evacuated or closed on spray days, or urgent studies undertaken to evaluate spray penetration into buildings, and practical methods of protecting, venting, or cleaning school premises subsequently implemented.

## WHAT YOU ARE BEING TOLD BY MAF

MAF say the spray is an organic insecticide called Btk (*Bacillus thuringiensis* var. *kurstaki*) that is a naturally-occurring bacterium found in soil. All the other ingredients are registered for use in food and cosmetics etc. It does not harm people, only caterpillars, and Public Health have given it a 'clean bill of health'.

The aerial spray is being delivered in 60-80 metre wide swathes by three different aircraft operating at 45 metres height. MAF say Global Positioning Systems (GPS) on board map their flight paths automatically, enabling accurate delivery without swathe overlap on adjacent runs.

But MAF says the spray will also drift and have calculated a maximum drift zone of between 200 and 400metres outside the spray swathes. They say operations cease when wind speed exceeds 18kph (up from 12kph on the original spray operation) although wind gusts over this speed may occur during spraying.

MAF say the spray is being delivered from first light when ideal cool and calm conditions are present, with lower humidity and temperatures. MAF says the size of the spray droplets is designed to be large enough to fall rapidly onto their surface target, and smaller respirable aerosols are 'unlikely' (HRA).

Overall advice from the authorities for avoidance of the spray is to remain indoors with all doors, windows and chimneys sealed for several hours after application. But for schools the only advice is to just keep children inside during spraying. Public Health has also advised MAF they should not spray when children are walking to and from school.

## WHAT IS NOT BEING TOLD

### 1.0 The spray is NOT organic and/or harmless

The spray is a complex chemical mix called Foray 48B that is not organic, nor is it registered for use, or used by, NZ organic farmers.[1] Btk is only the active ingredient that kills the caterpillars. The remaining 98% of the spray ingredients are a commercial secret.

Whilst we are told the spray contains so-called inert ingredients such as sunscreens, anti-bacterial and fungal inhibitors, sticking and anti-evaporation agents, appetite stimulants etc, we cannot be told their chemical names in order to protect the commercial advantage of the manufacturer. Mounting health concerns about the spray have led to repeated requests over the years to the manufacturer to reveal these ingredients to the public. All have been denied.

But an analysis of Foray 48B carried out by a Canadian University in 1999[2] revealed with a degree of certainty, a number of chemicals **that would fit these functions noted above**. These chemicals are not benign as suggested by the word 'inert'.

Antifungal and antibacterial food preservatives BHT (butylated hydroxytoluene), and benzoic acid identified in the formulation, can both provoke allergic reactions. They are

[1] NZ Biological Producers & Consumers - personal communication
[2] "Airborne Exposures to *Bacillus thuringiensis* var. *kurstaki* During Gypsy Moth Eradication" Final Report to the Capital Health Region - May 2000 - KayTeschke et al

implicated in triggering hyperactivity, asthma, skin rashes and urticaria, and are not permitted in foods intended specifically for babies and young children. (McDonalds withdrew BHT from all its products in 1986).

These are only the 'minor' implications of these chemicals. Adverse effects on the lung, liver and cells - including cancer initiated cells - are all documented in scientific papers.[3]

Additionally the risk assessment carried out on these chemicals is flawed with respect to the aerial spraying campaign for two major reasons:

i. it relates to the ingestion of the chemicals, NOT the inhalation and the absorption rate across the respiratory mucosa which tends to be far greater and more rapid than for oral routes. Some pesticides are known to be 130 times more toxic when inhaled as opposed to ingested.[4] There are no toxicological studies for the inhalation of some of the chemicals in Foray 48b.

ii. it looks at each chemical alone as if it is the only chemical to which a person was to be exposed, when in reality Foray 48b contains many different chemicals. There is good evidence that the toxicity of some chemicals is dramatically increased when they are in combination with other chemicals due to synergistic interactions.[5]

The type of exposure to chemicals that is the most worrisome is that of on-going low dose exposure to mixtures of chemicals via inhalation – and this is what is being experienced with the aerial spray programme. The Health Risk Assessment for the aerial spraying programme has ignored this.

**In addition, because Public Health has signed a secrecy clause with the spray manufacturer, they can 'neither confirm nor deny' any specific ingredient is present in the mix. Therefore their Health Risk Assessment does not even evaluate them.**

For instance, really worrying clusters in East Auckland of miscarriages, premature births and thyroid problems have all been dismissed by Public Health because only the effects of 'infection by Btk' were investigated. The role of BHT or benzoic acid or any suspected endocrine disrupter in the spray's full complex mix cannot be examined - because to do so would admit its presence.

Reported adverse health effects from Foray 48B have persisted and grown. Year after year hundreds of new people in Canada and USA report the same symptoms as we experience here in Auckland. We do not have the resources to review all this evidence

[3] Some studies on BHT, BHA & TBHQ

[4] Whalan JE, Pettigrew HM. 1998. [Inhalation risk characterizations and the aggregate risk index]. Draft memorandum to M. Stasikowski, Director, Health Effects Division. US EPA. 25 p.

[5] Porter WP, Jaeger JW, Carlson IH. 1999. Endocrine, immune, and behavioural effects of aldicarb (carbamate), atrazine (triazine) and nitrate (fertilizer) mixtures at groundwater concentrations. *Toxicol Ind Health* 15(1-2):133-50

for you, but it is worth considering that in 1998 an Environmental Appeal Board in Canada, DID do this.[6]

In revoking a permit to spray a heavily populated area with Foray 48B, it considered thousands of pages of documentary evidence and testimony. Whilst the risks and benefits of that programme were different to West Auckland's - (one-off annual control rather than eradication) - the Panel still found that the aerial spraying would create

***" an unacceptable risk of health problems among the residents".***

The Panel agreed with the appellants that there was:

***"a risk to the health of children, people of all ages who have allergies, asthma and other respiratory ailments, people with immuno deficiencies, chemical hypersensitivities, and the elderly".***

They further ordered that - **No spraying be performed on school properties or open grassy areas which are used by children as play areas".** Severe problems and adverse health effects experienced by staff and children in many schools in the Eastern Suburbs spray zone, would testify to the soundness of this order.

## 2.0 Children are more susceptible and vulnerable

Children are not small adults. Their biology is different. Consider the import of these extracts from a special report on how children are exposed to pesticides in schools. [7]

- Children **breathe in a greater volume of air** relative to their body weight than do adults, and thus receive a greater dose of pesticide than an adult does when exposed to a similar concentration in the air.

- Children have a **greater skin surface area** relative to their body weight than do adults. A child with an equal amount of skin exposure to a pesticide would receive a greater dose relative to body weight than an adult with the same exposure.

- One study estimated that children under the age of five ingest 2.5 times more soil from around the home than adults, though they have only 20% of the body weight. Thus, they have **at least twelve times greater potential health risk** than an adult from any pesticides …

Whilst the risk from the Foray 48B pesticide is far less than the pesticides detailed in this NCAP report, it clearly shows that overall the health risk for a child is far greater than an adult's. Their physiology, behaviour and lifestyle all bring them into contact with a greater volume of pesticide. Additionally the developing neurological systems are at greater risk from exposure to neurotoxicants.

[6] Environmental Appeal Board Decision - April 15, 1998
[7] Unthinkable Risk. How Children are Exposed and Harmed when Pesticides are Used at School. NCAP.

The ability of aerially applied pesticide sprays to migrate indoors where they can accumulate and persist, is of huge concern for schools. The above report notes that when multiple routes of exposure from a single pesticide are considered, children indoors may even be exposed to **pesticide doses of public health concern**.

## 3.0 The spray will drift - it will penetrate all buildings - it will persist both indoors and outside.

Drift is not just the visible droplets that fall outside each aerial swathe, it is the smaller invisible aerosols. They fall slower and therefore remain suspended in the air for longer. Some aerosols will take hours to fall to the ground and settle, and the smallest may remain airborne for days. Whilst airborne they are of course subject to the wind and all air currents and movements. They will drift beyond each swathe, they will drift beyond the spray zone and they will drift into ALL buildings.

How far and by how much here in West Auckland, we don't know. MAF, Public Health, the Minister of Biosecurity and the Minister of Health have all refused or ignored our urgent requests and pleadings to carry out monitoring and sampling studies.[8]

**In particular, we requested in early January 2002, that during the first aerial spray operation MAF should take the opportunity while schools were closed to carry out indoor air sampling. This could have determined the level of penetration in schools both sealed and operating normally, the degree of persistence indoors, and methods of 'venting' or clearing the buildings.**

As this was not done, we return to the major piece of research that alerted us to the practical reality of spray drift. This is the comprehensive study done in Vancouver in 1999.[2] It was undertaken for their Capital Health Region specifically to gather data for their Human Health Surveillance Committee about the risks of exposing the public to Foray 48B during aerial spraying. The study showed that:

- There was measurable drift of spray up to one kilometre away, and for nine days. (Sampling ceased at 1km and 9 days).
- Outside there were higher concentrations downwind than in the spray zone.
- There were re-elevated readings in the spray zone when an adjoining area was sprayed the following day.
- The highest concentrations both inside and out, tended to be 2 to 3 hours after start of spraying, although indoors initially they were much lower. Concentrations were slightly lower during the spray.
- Indoor measurements 5-6 hours after spraying were higher than outside - (indoor sampling finished at 6 hours).

[8] Report by STOP and CC-PAM on Btk aerial spraying - Nov 2001 - and letters to Director of Biosecurity, Hon Jim Sutton and Hon Annette King.

- Migration of Btk inside probably took place with the resumption of normal activities.
- Aerosol sizes were far smaller than expected, and will be inhaled into the small airways of the lungs.
- Indoor concentrations appeared to dissipate much more slowly than those outside.

**The Authors' recommendations (see Appendix A) highlight the complex and unexpected results of their study, and the need for further research. That our NZ authorities are not prepared to do this, and are determined to continue blindly ignoring both the study and its results, gives us little confidence that public protection is uppermost in their minds.**

## 4.0 Current advice will NOT protect children inside or outside school

MAF originally stated they would spray all schools and childhood establishments BEFORE the commencement of the school day. Our initial scepticism of the practicalities of this with schools scattered across the zone and 7-8 hours needed to complete the whole spray was borne out.

Even when starting at first light, MAF will still be spraying when children are walking to school. In addition when adjoining areas are sprayed, whether the same day or next, there will be drift. Children attending schools outside the spray zone are also of course caught in the early morning spray.

Spray on any morning will still be settling as school commences even if sprayed at dawn. Even if closed until the last minute - school buildings will already have been penetrated by spray, and further volumes will migrate in with the children as they arrive.

Spray will continue to track in from outside with normal movement of children around the school. Through open windows and doors, ventilation or air-conditioning units. On shoes and clothes and equipment. The particles will be the smallest respirable ones, and with constant indoor movement will continue to remain in the air for some time.

When settled, the spray will stick to all surfaces. Whilst we know the Btk will remain viable inside for an unknown time, we do not know how long the chemicals in the spray persist, or how they break down. Outside, settled spray particles remain for days on all surfaces and will continue to be tracked into buildings. Any extended period without rain will allow particles to dry out and re-enter the air.

The physiology and lifestyle of all children make them far more vulnerable than adults to any pesticide. In New Zealand we have the additional problem that the numbers of children already suffering from allergies and asthma related conditions is among the highest in the world. Schools cannot cater for, and protect these children individually as parents would do. In this situation their responsibilities must lie with protecting the whole student body.

## CONCLUSION

**In these circumstances outlined above, the precautionary principle must be applied and the only prudent and responsible action is to close or evacuate schools and childhood establishments on spray days.**

**Even when this is done - but vital if no evacuation is carried out - studies must still be undertaken as a matter of urgency to evaluate spray penetration into buildings, and practical methods of protecting, venting and cleaning the buildings and making them as safe as possible for the children to return to the next day.**

**In the final analysis, it may well be that the risks of this spray programme and the inability of officialdom to protect our children are too great, and the aerial operation should be halted.**

**October 2002**

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1. NZ Biological Producers & Consumers - personal communication. M.watts@organicnz.pl.net

2. "Airborne Exposures to *Bacillus thuringiensis* var. *kurstaki* During Gypsy Moth Eradication" Final Report to the Capital Health Region - May 2000 - KayTeschke et al. Full report available at: www.soeh.ubc.ca/research/Report%202001/Btk_Exposure_Report.pdf

3. Feingold diet - studies on BHT & BHA. www.feingold.org/bht.html

4. Whalan JE, Pettigrew HM. 1998. [Inhalation risk characterizations and the aggregate risk index]. Draft memorandum to M. Stasikowski, Director, Health Effects Division. US EPA. 25 p.

5. Porter WP, Jaeger JW, Carlson IH. 1999. Endocrine, immune, and behavioural effects of aldicarb (carbamate), atrazine (triazine) and nitrate (fertilizer) mixtures at groundwater concentrations. *Toxicol Ind Health* 15(1-2):133-50.

6. Environmental Appeal Board's Decision - April 15, 1998. Province of British Columbia Pesticide use Permit No 214-018-98. For copy email Hana Blackmore bmore@iconz.co.nz

7. "Unthinkable Risk. How children are exposed and harmed when pesticides are used at school". Special Report by the Northwest Coalition for Alternatives to Pesticides. www.pesticide.org/UnthinkableRisk.html

8. "Aerial Spraying against the Painted Apple Moth - Btk pesticide exposure, spray drift and environmental persistence." - November 1st 2001 - Report by Hana Blackmore for CC-PAM. Letter to MAF Group Director, Barry O'Neil, Hon Jim Sutton 5.1.02, Hon Annette King 8.1.02. Available from: bmore@iconz.co.nz

# APPENDIX A

# Airborne Exposures to *Bacillus thuringiensis* var. *kurstaki* During Gypsy Moth Eradication

*Final Report to the Capital Health Region* - May 2000

Kay Teschke, Yat Chow, Karen Bartlett, Chris van Netten, Victor Leung, Andrew Ross

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## RECOMMENDATIONS

*4.2.6 Recommendations*

The results of this study suggest the following:

- Small *Btk* aerosols, in a size range that can reach deep into the human respiratory tract, were measured during and after the aerial spraying. These aerosols likely contain all components of the Foray 48B formulation, yet most of these components remain unknown because of the difficulties of identifying specific chemicals in such complex mixtures. It would facilitate risk assessment if the pesticide manufacturers would identify the inert ingredients.

- During the spray period, staying indoors with all doors and windows closed resulted in exposures lower than those outdoors. However, exposures indoors increased within 3 hours after spraying and were higher than outdoor concentrations by 5 to 6 hours after spraying began. Indoor concentrations appeared to dissipate much more slowly than outdoor concentrations. In future exposure studies, indoor concentrations should be measured for up to 9 days after spraying to determine the half-time of the *Btk* in indoor environments.

- The pattern of airborne concentrations of *Btk* appeared to differ indoors and outdoors. Future studies should measure factors such as UV light intensity, aerosol size distributions, traffic into and out of homes, humidity, temperature, local wind speeds, presence of open windows, and natural air infiltration to determine which factors are associated with increased and reduced *Btk* concentrations in both indoor and outdoor environments

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- Drift of the *Btk* aerosol was detected throughout a zone up to 1 km away from the spray area. Future studies should measure air concentrations more distant than 1 km away from the spray zone (perhaps up to 25 km away), to allow estimation of the maximum drift distances. Some factors which contribute to drift, such as wind speed, temperature, and relative humidity, were detected in this study. Studies examining other potential explanatory variables (e.g., plane speed) would be valuable.

- Kromecote cards were not an effective indicator of airborne exposures to *Btk*. Future studies examining personal exposures should use filter or Andersen sampling techniques to directly measure air concentrations of *Btk*.

- No relationship was seen between air concentrations and positive or negative nasal swabs. Future studies should record factors such as hand contact with contaminated surfaces, rhinitis, and personal airborne exposure levels in order to investigate factors which contribute to the presence of *Btk* in nasal swabs.