

Vietnam Veterans and the “*Toxic Environment*”

Summary & Conclusions

The term “*toxic environment*” was probably coined in New Zealand by a committee of politicians in 2004. It does not seem to be a term used in the research, or in legislation and regulation.

It refers generally to the pesticides (herbicides and insecticides) sprayed in Vietnam, and to various repellents and medications, which included:

- the tactical herbicides or “Agents” (mostly Orange, White and Blue);
- the commercial herbicides such as a Creosote/distillate mixture, Borate Chlorate, Gramoxone, Reglone, Tordon D and Paraquat;
- the insecticides Pyrethrin, DDT, Dieldrin, Lindane, Chlordane, Diazinon, and Malathion;
- the insect (mosquito, mite and tick) repellents such as DBP, DIMP and DEET; and
- the anti-malarial prophylactic medications Paludrine and Dapsone.

In this paper I do not deny that there were many chemicals (listed above) deployed for use at Nui Dat and elsewhere in Vietnam. The so-called “*toxic environment*”. I have attached papers (at Annex A and Annex B) by two of my Australian colleagues who document the widespread use of potentially dangerous insecticides at Nui Dat. However, I argue in this paper that there is no evidence that exposure to those chemicals caused serious health effects in New Zealand soldiers in Vietnam, or any health effects in Vietnam veterans, post-Vietnam.

To revisit the conclusions of previous papers,¹ there has been a great deal of scientific research into the claimed exposure and effects of Agent Orange and other tactical herbicides on the health of Vietnam veterans and their children. The research has been unable to establish evidence of individual or collective exposure of Vietnam veterans (other than those USAF and Chemical Corps personnel who mixed, stored and sprayed the defoliants) in sufficient dosage over sufficient time to cause any of the claimed health effects. Epidemiological studies have failed to find any significant increase of disease, disorder, disability or death in Vietnam veterans over and above the incidence in control groups and in the general population.

In the case of Agent Orange, in the absence of evidence of exposure and causation, and in the absence of epidemiological evidence, policy makers have given veterans the benefit of the doubt by accepting a range of

¹ Available at <https://putatara.net/agent-orange/>

conditions as presumptively related to service in Vietnam². These are included in the presumptive list published on 30 August 2007 and now included in the Veterans Support Regulations 2014³, and in the Australian Statements of Principles (SOPs)⁴ now incorporated into New Zealand legislation and regulation.⁵

There is no scientific evidence of any association between service in Vietnam and birth defects in the children and grandchildren of veterans. However in New Zealand there are five “*accepted*” or presumptive conditions for the children of veterans. For a full analysis of birth defects see my earlier paper, “*The Trans-generational Effect of Agent Orange*”.⁶

Regarding the subject of this paper, the “*toxic environment*”, there has been little if any research into the effects of any of the other chemicals on Vietnam veterans except for Dapsone. The Australian Dapsone study concluded that there were no lasting effects.⁷ The epidemiological research, that has found no increase in the incidence of disease, disorder, disability or death in Vietnam veterans over and above the incidence in the general population, indicates that the adverse health claims relating to the “*toxic environment*” are as unfounded as the Agent Orange claims.

Nevertheless the SOPs do include a few conditions (ischaemic heart disease, Hodgkin’s lymphoma, aplastic anaemia, anosmia, and Parkinson’s disease) that have exposure to certain insecticides as one possible contributing factor among many. However the combination of the required accumulation (hours) of exposure, the period over which the exposure is required to have occurred, and latency periods after exposure, would seem to preclude Vietnam veterans.⁸

Those contributing insecticide factors are probably drawn from research into other occupational groups in the manufacturing and application of insecticides, given that there is no research relating to Vietnam veterans.

As with presumed exposure to tactical herbicides those SOP conditions with exposure to insecticides as contributing factors are presumptive in the absence of proof.

I conclude therefore that the use of the term “*toxic environment*” might be a useful popular description of the range of chemicals deployed in Vietnam. I suggest that we should note that other “*toxic*” elements in that environment included alcohol and tobacco, ticks and mites, and the two flying objects that caused many of the casualties; mosquitos and bits of

²Himona, R.N., Presumption: The Bridge Across and Between Understandings and Misunderstanding, 29 April 2018. Available at <https://putatara.net/wp-content/uploads/2018/04/AO-Presumption.pdf>

³ <http://www.legislation.govt.nz/regulation/public/2014/0369/52.0/DLM6316621.html>

⁴ <http://www.rma.gov.au/sops/>

⁵ <http://www.legislation.govt.nz/regulation/public/2014/0369/52.0/DLM6316734.html>

⁶ Available at <https://putatara.net/wp-content/uploads/2018/04/The-Transgenerational-Effect-of-AO.pdf>

⁷ Wilson EJ, Horsley KW, van der Hoek R. Dapsone exposure and Australian Vietnam Service: Mortality and Cancer Incidence. Canberra: Department of Veterans’ Affairs, 2007.

⁸ See details of the factors later.

metal. “*Toxic environment*” relating to chemicals has no basis as a causative factor in the health conditions of Vietnam veterans. Its use in that context is populist and emotive rather than factual and scientific.

Toxic Environment?

General

“*Toxic Environment*” is a term that has come into currency in New Zealand since about 2004. It is generally used to refer to the pesticides⁹ and other chemicals encountered by soldiers in the Vietnam War. In this usage it refers mainly to sprayed herbicides and insecticides, but has been used to include insect repellents and anti-malarial treatment and the prophylactic medicines Paludrine and Dapsone.

The term has cropped up in response to my series of papers in the NZ Vietnam Veterans & Families Facebook group on the herbicide Agent Orange¹⁰, initially in this response by Doc Mountain:

“Far more important to put the AO debate behind us and focus on what in fact constituted the “Toxic Environment” that many Personnel deployed to Vietnam were exposed to. It became clear to me, from personal experience, that both our Military and Medical Hierarchy clearly fell short in their accountability and duty of care by failing to identify, mitigate and follow through on the risk and threat levels of exposure to the toxic soup of chemicals deployed personnel would or could be exposed to. I might also suggest that very same potpourri of toxic substances were experienced, to a greater and/or lessor degree, by all those deployed to SEA environments and those deployed to the Sandbox or the Stan and the other trouble spots our Brothers and Sisters have been. Sadly I have neither the energy nor wherewithal to sit down and present a thesis on my observations and experiences as a Medic of 23 years’ service. Nonetheless that it has been accepted, in the situation of Vietnam Veterans, we were exposed to a “Toxic Environment” should be suffice to accept that exposure should encompass all poisonous chemicals and not just focus on Agent bloody Orange.”

Which prompted me to explore the concept of “*Toxic Environment*” as it is used in New Zealand.

⁹ Wikipedia - Pesticides are substances that are meant to control pests, including weeds. The term pesticide includes all of the following: herbicide, insecticides (which may include insect growth regulators, termiticides, etc.) nematicide, molluscicide, piscicide, avicide, rodenticide, bactericide, insect repellent, animal repellent, antimicrobial, fungicide, disinfectant (antimicrobial), and sanitizer. The most common of these are herbicides which account for approximately 80% of all pesticide use. Most pesticides are intended to serve as plant protection products (also known as crop protection products), which in general, protect plants from weeds, fungi, or insects.

¹⁰ As is common in most commentary I use the term Agent Orange generally to include all of the tactical herbicides or defoliants used during the Vietnam War.

I did a search through the US, Australian and New Zealand literature, research, submissions, reports, legislation and commentary on the health concerns of Vietnam veterans. I reached the surprising conclusion that “*toxic environment*” most probably began in the New Zealand Parliamentary Health Select Committee in 2004, not as a concept introduced into scientific evidence, but as a term coined by the committee itself, a committee of politicians. Whatever the relevance of that, I was somewhat intrigued.

Science, Policy or Popular Rhetoric?

That did indicate however that it is a term and a concept that has not informed any of the scientific and medical research into the health of Vietnam veterans. I didn’t find any reference to “*toxic environment*” in any of the research I searched. Some of that research has occasionally mentioned pesticides and insecticides, but only occasionally. The research has focused almost exclusively on tactical herbicides, and has not included the commercial herbicides used in and around bases in Vietnam. That indicates that whatever the actual health effect of a “*toxic environment*” might or might not have been, it is not something that has been verified by research.

“*Toxic environment*” is not a term generally used in the policy arena. In New Zealand it does not appear in either the Veterans Support Act 2014 or the Veterans Support Regulations 2014. It is however used in some Veterans Affairs New Zealand documentation¹¹. While the term itself is not used in the Australian Statements of Principles (SOPs), exposure to some of the insecticides encountered in Vietnam are considered to be factors in a few of the health conditions covered by the SOPs, which have been adopted in New Zealand legislation and regulation.

As is the case with Agent Orange and other tactical herbicides, that does not mean that exposure to those insecticides, repellents and medications has been scientifically established, or that such exposure has been shown to cause health conditions in Vietnam veterans. It means that some conditions have been accepted by the Australian Repatriation Medical Authority based on presumption¹² rather than proven causation.

Its absence in the research and in current policy would indicate that it is a term limited mostly to popular usage.

¹¹ VANZ, Annual Medical Assessment form, Background, “*In recognition of the fact that Viet Nam veterans were exposed to a toxic environment during their service in Viet Nam, the government is funding an ongoing medical assessment for all Viet Nam veterans.*”

¹² See Himona, R.N., Presumption: The Bridge Across and Between Understandings and Misunderstanding, 29 April 2018, <https://putatara.net/wp-content/uploads/2018/04/AO-Presumption.pdf>

Where did “*Toxic Environment*” originate?

The term “*toxic environment*” would appear to be a term and a concept residing almost entirely in popular discourse on the health effects of the Vietnam War, and it would seem to be confined to usage in New Zealand.

The term first appeared in New Zealand in the report of the Health Select Committee:

*“We consider that there should be a general presumption among health professionals that Vietnam veterans were exposed to a toxic environment, and veterans should be treated on that basis.”*¹³

On the basis of that consideration the HSC then recommended as follows:

*“We recommend to the Government that Veterans Affairs New Zealand be responsible for a campaign to inform health professionals about the specific health needs of Vietnam veterans, based on the presumption that Vietnam veterans were exposed to a toxic environment.”*¹⁴

Note that it recommended a presumption. However elsewhere in its report the Health Committee asserted “*exposure to a toxic environment*” as a fact rather than a presumption.¹⁵ The Committee seems not to have been clear about the difference between fact and presumption.

“Consequently, most studies of health outcomes on Australian and United States Vietnam veterans have assumed that all defence personnel in Vietnam were exposed to a toxic environment, including herbicides.”

“We know that New Zealand Vietnam defence personnel were exposed to herbicides and served in the same potentially toxic environment as the Australian and United States forces.”

Splitting hairs, the Australian and United States research, legislation and regulation did not refer to a “*toxic environment*” at all, and was generally quite specific and referred to herbicides or defoliants, mostly Agent Orange.

The Joint Working Group¹⁶, taking its lead from the Health Select Committee, and declaring that it began its work based on its acceptance of the findings of the HSC, did define what it meant by the term “*toxic environment*”:

“Toxic environment (1) The term “toxic environment” was used in the Health Committee’s report and has been the term used consistently by the

¹³ Inquiry into the exposure of New Zealand Defence personnel to Agent Orange and other defoliant chemicals during the Vietnam War and any health effects of that exposure, and transcripts of evidence, Report of the Health Committee, 27th Parliament, Steve Chadwick (Chairperson), October 2004, p 38.

¹⁴ Ibid, p 38.

¹⁵ Ibid, p 29.

¹⁶ Joint Working Group on Concerns of Vietnam Veterans, Report to the Government, April 2006, p 12.

JWG. It encompasses more than direct aerial spraying of Agent Orange (a systemic defoliant containing the herbicide 2,4,5-T which, in turn, was contaminated by the dioxin TCDD 5). Even if New Zealand troops were not directly sprayed, they operated in areas which had been defoliated by aerial spraying, they travelled, lived and fought in these areas, and dug their firing positions in the contaminated earth. Some filled their water bottles from contaminated streams. In the dry season others breathed in the dust from helicopter rotor wash. (2) Aerial-delivered herbicides other than Agent Orange were also used in their areas of operation. (3) New Zealand soldiers hand-sprayed camp perimeters and living areas with dioxin-contaminated herbicides, often with little or no protective equipment. (4) It should also be noted the dioxin levels in herbicides provided for military use were much higher than the equivalents provided for commercial agricultural spraying – presumably for reasons of cost and speed of production. (5) There were three other contributors to the toxic environment. Pesticides were widely used to control malaria-carrying mosquitoes; we have heard how Dapsone, a controversial anti-malarial treatment, was administered to New Zealand troops; and it is likely the rubber plantations where New Zealand troops were based contained residues of agricultural chemicals, including lead-arsenic and other heavy metals. (6) The effects of this chemical cocktail are not yet fully understood. This fact alone argues for continuing engagement and action on this issue”.

Based on the JWG Report the 2006 Memorandum of Understanding also focused in part on the “toxic environment”:

“The Apology will:

- (a) acknowledge the Service to New Zealand of all Viet Nam Veterans;*
- (b) acknowledge the failure of the Crown to address concerns raised by the Viet Nam Veterans in relation to their exposure to the toxic environment during their Service in Viet Nam and the effects of subsequent delays in, or lack of treatment of, the Viet Nam Veterans after that exposure.*
- (c) publicly reiterate existing government policy in relation to the treatment of Viet Nam Veterans who have been affected by the toxic environment in Viet Nam.”¹⁷*

It should be noted that none of the above in relation to the “toxic environment” was based on causation verified by research, but was based on presumptive conditions established through correlation, and on anecdotal accounts. What was presented in the MOU as fact was actually presumption established only in relation to Agent Orange, and not in relation to any other pesticides or medications.

¹⁷ Memorandum of Understanding, The Ex-Vietnam Services Association and The Royal New Zealand Returned and Services Association and Her Majesty the Queen in Right of New Zealand, 6 December 2006, para 2.3.

The MOU was a reflection of the claims of Vietnam veterans, and the acceptance of some of the claims as policy, rather than a reflection of the science.

Based on the commitment made in the MOU, in the May 2008 Crown apology¹⁸ Prime Minister Helen Clark spoke about Agent Orange¹⁹, “dioxin contaminated herbicides and other chemicals”²⁰, and stated:

*“The commitments the Crown has made to the treatment of Viet Nam veterans who were affected by toxic environments in Viet Nam and to their families are set out in the Memorandum of Understanding of 6 December 2006, and the Crown will adhere to them.”*²¹

Which is why the VANZ Annual Medical Assessment (AMA) form refers to the “toxic environment”, as the AMA was an outcome of the MOU.

Where did it originate?

It looks as though the term “toxic environment” was coined by a committee of politicians, who had in effect joined the veterans’ lobby as co-claim makers, and in the ensuing process of inquiry and negotiation the term initially became accepted in policy as a wider concept than the prevailing Agent Orange narrative, with even less scientific evidence. But it didn’t make it out of the MOU and its mandated Crown apology into legislation and regulation.

Except through the back door in the Statements of Principles, not as a “toxic environment” concept, but as presumptive factors contributing to a few presumptive conditions. But those factors, examined in detail later, do not cumulatively support the concept of a “toxic environment” that is claimed to have had widespread health effect among Vietnam veterans.

The Chemicals

The insecticides used in Nui Dat were Pyrethrin, DDT, Dieldrin, Lindane, Chlordane, Diazinon, and Malathion. They are cited as factors in a few SOPs. Two papers critical of the use of insecticides at Nui Dat are attached at Annex A (Dr John Mordike²²) and Annex B (Robert Denner²³).

Historian Dr John Mordike points out that the insecticides used at Nui Dat were toxic and dangerous to human health. Mordike concludes:

¹⁸ Clark, H., Ministerial Statement to Parliament, Crown Apology to Viet Nam Veterans, 28 May 2008.

¹⁹ Ibid, paras 10, 11

²⁰ Ibid, para 14.

²¹ Ibid, para 16.

²² John Mordike is a military classmate (1963-66) of Colonel Sir Wira Gardiner. He was diagnosed with Multiple Myeloma Leukemia before he researched and wrote this paper.

²³ Bob Denner is a military classmate (1962-65) of the writer (Himona).

“Given the rates and methods of dispersal of Residual Insecticides and their toxicity and persistence in the environment, it is clear that the Nui Dat base was an increasingly toxic and dangerous environment for human habitation. Consequently, it is highly probable that the health of Australian and New Zealand veterans was adversely affected. I believe that a thorough examination of the morbidity of these veterans is warranted.”²⁴

Robert Denner was a supply officer in Vung Tau and Nui Dat. He describes the “*rampant and uncontrolled use of residual insecticides at 1 ATF base Nui Dat*”, and concludes:

“When I think of the blokes who may have died as a result of this ignorance and lack of investigation....I can name so many from both the units that I served in.....I believe that it is time that someone accepted responsibility.”²⁵

There were chemicals other than insecticides. The following is a reasonably complete list of the chemicals used in Phuoc Tuy, many of them at Nui Dat and other bases:²⁶

- the tactical herbicides or “Agents” (Orange, White and Blue) that were not sprayed at the bases;
- the commercial herbicides such as a Creosote/distillate mixture, Borate Chlorate (sodium borate and sodium chlorate), Gramoxone (Paraquat I, I dimethyl-4, 4-bipyridium salt), Reglone (diquat-6, 7-dihydrodipyridopyrazidinium salt), Tordon D (picloram & 2.4-D) and Hyvar X-ws’l (bromocol-5-bromo-3-sec-butyl-methyluracil);
- the insecticides Pyrethrin, DDT, Dieldrin, Lindane, Chlordane, Diazinon, and Malathion;
- the insect (mosquito, mite and tick) repellents such as DBP (dibutyl phthalate), DIMP (dimethyl phthalate), and DEET (N, N-diethyl-m-toluamide); and
- the anti-malarial prophylactic medications Paludrine and Dapsone.

The names themselves are enough to conjure up a wildly vivid image of a “*toxic environment*”.

The “Rainbow” tactical herbicides are described in a previous paper (“*The Rainbow Agents*”²⁷). There is a separate paper arguing that we were not exposed to Agent Orange, directly or indirectly (“*Agent Orange Exposure*”²⁸).

²⁴ Annex A, p 11.

²⁵ Annex B, p 2.

²⁶ Smith, F.B., Part IV Agent Orange: the Australian aftermath, in O’Keefe, B.G., *Medicine at War*, Medical aspects of Australia’s involvement in Southeast Asia 1950-1972, Allen & Unwin, 1994, pp 286-288.

²⁷ Available at <https://putatara.net/wp-content/uploads/2018/06/The-Rainbow-Agents.pdf>

²⁸ Available at <https://putatara.net/wp-content/uploads/2018/04/AO-Exposure.pdf>

There is confusion about the herbicides used around the various bases; at Nui Dat, the Horseshoe, and at the numerous fire support bases. It is commonly believed that those herbicides were Agent Orange. However they were commercial herbicides. Before April 1967 the standard weedkiller was Borate Chlorate but it was not effective. It was not used after about August 1967. A mixture of Creosote and distillate was also used before August 1967 but it too was not effective. Late in 1967 other herbicides were tried. Gramoxone failed. Reglone was successfully used between November 1967 and February 1972. It was sprayed by guns or from a boom on the back of a truck, and from a boom on an RAAF helicopter. Tordon-D was used between December 1968 and January 1971. Hyvar X-ws'l was applied by hand sprayer and truck-mounted boom from July 1968.²⁹

The anti-malarial insecticide Malathion was used in the 'fogging' machines, and sprayed by backpack and truck about twice weekly at Nui Dat and Vung Tau, and up to twice daily at the fire support bases. It was also the insecticide sprayed regularly by USAF Operation FLYSWATTER C123 aircraft. Spraying was more intense during the wet season. Malathion has often been mistaken in memory for Agent Orange.

A paper concerning the insect repellent DBP ("*Dibutylphthalate (DBP) and Intergenerational Birth Defects*") is available online.³⁰ It disputes the DBP claim (Malaysian service) presented to the Waitangi Tribunal at Tuahiwi Marae in July 2016.

Undoubtedly the use of chemicals at Nui Dat was widespread and loosely controlled. And the insecticides used varied from extremely toxic to mildly toxic. What has not been shown is that anyone was exposed to a sufficient dose over sufficient time to cause serious adverse health effects at the time of exposure or shortly thereafter, or in the post-Vietnam years and decades.

In the first place there has been virtually no research into the effects of the chemicals, other than Agent Orange and Dapsone. And in the second place epidemiological studies indicate that the incidence of disease, disorder, disability and death in the Vietnam veteran group is not significantly higher than the incidence in the general population.

Classification of the Chemicals In the Statements of Principles

The insecticides referenced in the SOPs are classified as organophosphates and organochlorides. The herbicides are phenoxy acid herbicides.

²⁹ Smith, F.B., 1994, pp 286-288

³⁰ Available at <https://putatara.net/wp-content/uploads/2018/06/DBP-Research-1.pdf>

Organophosphates

Organophosphates include:

- Malathion;³¹ ✓
- Diazinon; ✓
- Parathion;
- Methyl parathion;
- Chlorpyrifos;
- Dichlorvos;
- Phosmet; and
- Fenitrothion.

Malathion and Diazinon were used in Nui Dat. Malathion was also sprayed in other parts of Phuoc Tuy province, including in operational areas close to both friendly and enemy Vietnamese malaria carrying populations.

Organochlorides

Apart from Malathion and Diazinon all the other insecticides used in Vietnam are organochlorides. Those marked “✓” were used in Nui Dat. Organochlorine pesticides are chlorinated hydrocarbons used extensively from the 1940s through the 1960s in agriculture and mosquito control. Representative compounds in this group include:

- DDT; ✓
- Dieldrin; ✓
- Chlordane; ✓
- Lindane; ✓
- Methoxychlor;
- Toxaphene;
- Mirex;
- Kepone; and
- Benzene hexachloride.

Specified list of pesticides

In the SOPs a pesticide, or a “*pesticide from a class of pesticides from the specified list*” means:

- Organochlorines;
- Organophosphates;
- Paraquat; and
- Carbamates.

³¹ Malathion is an organophosphate used to control mosquitos, and is a recommended head lice treatment in New Zealand.

Phenoxy Acid Herbicides

Phenoxy acid herbicides (from the specified list) means:

- 2,4-dichlorophenoxyacetic acid (2,4-D);
- 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), or
- 2-methyl-4-chlorophenoxyacetic acid (MCPA)

2,4-D and 2,4,5-T are the two components of the tactical herbicide Agent Orange. 2,4,5-T included the contaminant 2,3,7,8-tetrachlorodibenzo-*para*-dioxin (TCDD).

The Statements of Principles

Wayne Lindsay assisted in the writing of this paper by searching through the Statements of Principles for any conditions and factors relating to chemicals, including insecticides and herbicides, listed below.³²

What most Vietnam veterans may not know is that a few health conditions related to chemicals other than herbicides or defoliants are already covered by the Statements of Principles and, like the conditions related to defoliants, they are presumptive conditions in the absence of scientific and medical proof of either exposure or causation. That is, they should simply be accepted without implying that there is any evidence of exposure and causation. For presumption is not proof; it is benevolent policy and a practical application of the benefit of the doubt.

This following section lists SOP conditions and the chemical factors contributing to those conditions.

Note again that these are based on presumption rather than causation. Note also that there are lengthy minimum “cumulative periods” of presumed exposure. A cumulative period of 2,500 hours would require constant exposure 10 hours a day for 250 days. The exposure also has to occur within a specified period before the onset of the disease.

These factors are not based on veteran specific research but most probably on research relating to other occupational groups involved in the manufacture or application of the chemicals. Hence the lengthy cumulative periods.

³² Wayne knows the SOPs as well as or better than any other veterans’ advocate, having completed Australian courses on the use of SOPs and used them for about 15 years before they became part of New Zealand legislation and regulation.

Ischaemic heart disease³³ (organophosphate exposure)

Factor 9 (43) (g): having an episode of acute cholinergic poisoning from exposure to an organophosphorus ester within the seven days before the clinical onset of ischaemic heart disease.

Hodgkin's lymphoma³⁴ (organophosphate exposure)

Factor 6 (j): inhaling, ingesting or having cutaneous contact with an organophosphate insecticide, (i) for a cumulative period of at least 2 500 hours, within a consecutive period of ten years, before the clinical onset of Hodgkin's lymphoma; and, (ii) where the first exposure occurred at least five years before the clinical onset of Hodgkin's lymphoma. Examples of organophosphates include the following:

- Insecticides - Malathion, Parathion, Diazinon, Fenthion, Dichlorvos, Chlorpyrifos, ethion'
- Nerve gases – Soman, Sarin, Tabun, VX;
- Ophthalmic agents – Echothiophate, Isoflurophate;
- Anthelmintics – Trichlorfon; and
- Herbicides – Tribufos (DEF), Merphos.

Aplastic anaemia³⁵ (organophosphate and organochlorine exposure)

Factor 6 (h): inhaling, ingesting or having cutaneous contact with a pesticide, or a pesticide from a class of pesticides from the specified list, on at least 30 days within the six months before the clinical onset of aplastic anaemia.

"A pesticide, or a pesticide from a class of pesticides from the specified list" means:

- Carbamates;
- Organochlorines;
- Organophosphates (including malathion and diazinon); or
- Paraquat.

For this condition therefore, all chemicals included in the Mordike document are relevant with the limitation being contained in the factor above.

Anosmia³⁶ (organophosphate exposure)

Factor 6 (k): inhaling fumes from a specified volatile substance for a cumulative period of at least 5000 hours, before the clinical onset of

³³ SOP 1/2016. <https://www.legislation.gov.au/Details/F2017C00851/Download>

³⁴ SOP 35/2014. <http://www.rma.gov.au/sops/condition/hodgkin-s-lymphoma>

³⁵ SOP 50/2012. <https://www.legislation.gov.au/Details/F2016C00274/Download>

³⁶ SOP 118/2011. <http://www.rma.gov.au/sops/condition/anosmia>

anosmia, and where that exposure has ceased, the clinical onset of anosmia occurred within one year of cessation

The specified volatile substances include organophosphate pesticides with the limitations being contained in the above factor.

Parkinson's disease or secondary parkinsonism³⁷
(*organophosphates and organochlorines*)

Factor 9 (a): inhaling, ingesting or having cutaneous contact with a pesticide from the specified list of pesticides, for a cumulative period of at least 1 000 hours, before the clinical onset of Parkinson's disease or secondary parkinsonism.

The specified list of specified pesticides is:

- a dithiocarbamate-based fungicide;
- an organochlorine insecticide;
- an organophosphorus ester;
- Paraquat;
- Rotenone; or
- the phenoxy acid herbicides 2,4-dichlorophenoxyacetic acid (2,4-D) or 2,4,5 - trichlorophenoxyacetic acid (2,4,5-T).

The limiting factor is the cumulative period of exposure being 1,000 hours

Benzene and arsenic exposure

Other exposures which are contained in the SOPs are to Benzene and Arsenic. However, once again through the limitations and latency periods, they are also not relevant to Vietnam veterans (if such exposure even existed).

TCDD/Dioxin exposure³⁸

Exposure to the contaminant in the 2,4,5-T component of Agent Orange, TCDD/dioxin (2,3,7,8- *tetrachlorodibenzo-para-dioxin*), is included in the SOPs as a factor in the following conditions:

- Ischaemic Heart Disease;
- Soft Tissue Sarcoma;
- Chloracne;
- Non-Hodgkins Lymphoma;
- Hodgkins Lymphoma;
- Porphyria Cutanea Tarda;
- Aplastic Anaemia;

³⁷ SOP 55/2016. <http://www.rma.gov.au/sops/condition/parkinson-s-disease-and-secondary-parkinsonism>

³⁸ All these Statements of Principles are available for viewing or download at the Australian Repatriation Medical Authority website <http://www.rma.gov.au/sops>

- Prostate Cancer;
- Parkinson's Disease;
- Myeloma;
- Peripheral Neuropathy;
- Type 2 Diabetes; and
- Lung Cancer.

All have dioxin as a factor however the limiting factors once again make them irrelevant due to the latency of the conditions.

Dapsone exposure³⁹

Exposure to Dapsone is included as a factor in the SOPs for the following conditions:

- Charcot Mafroe Tooth Disease;
- Porphyria Cutarnea Tarda;
- Peripheral Neuropathy; and
- Pancreatitis.

All have treatment with the drug Dapsone as a factor without any latency limitations.

Note however the 2007 Australian research that found:

*“that Army Vietnam veterans who took the Dapsone anti-malarial prophylaxis during their service have not experienced adverse health, as measured by mortality and cancer incidence, compared to those veterans who took anti-malarial treatment without Dapsone.”*⁴⁰

The first presumption: service in Vietnam

This factor appears in several SOPs relating to neoplasms. Being:

- on land in Vietnam;
- or at sea in Vietnamese waters; or
- on board a vessel and consuming potable water supplied on that vessel, when the water supply had been produced by evaporative distillation of estuarine Vietnamese waters;

for a cumulative period of at least 30 days, at least five years before the clinical onset of malignant neoplasm.

This is the first presumption; that service in Vietnam is a surrogate for exposure to sufficient dosage (dose-response) over sufficient time (time-

³⁹ Ibid.

⁴⁰ Wilson EJ, Horsley KW, van der Hoek R. Dapsone exposure and Australian Vietnam Service: Mortality and Cancer Incidence. Canberra: Department of Veterans' Affairs, 2007.

exposure) to invoke secondary presumptions relating to Agent Orange, based on correlation rather than causation.

Alcohol and tobacco

Whilst much focus over the decades has centred on defoliants, or in the last fourteen years on the “*toxic environment*”, two of the most prevalent factors in the SOPs are the lifestyle factors smoking and drinking. They are involved in a wide range of health conditions. Many of the epidemiological studies on Vietnam veterans have also commented on the lack of available information about alcohol and tobacco use as unknown confounding factors that if known would influence the interpretation and the conclusions of the studies.

Betel nut exposure

This has absolutely nothing to do with the “*toxic environment*” unless you acquired the habit up there. But it’s really interesting. Several SOPs have as a factor, chewing Betel nut. Systemic effects of Areca nut (Betel nut) are that it affects almost all organs of the human body, including the brain, heart, lungs, gastrointestinal tract and reproductive organs. It causes or aggravates pre-existing conditions such as neuronal injury, myocardial infarction, cardiac arrhythmias, hepatotoxicity, asthma, central obesity, type II diabetes, hyperlipidemia, metabolic syndrome, etc. Areca nut affects the endocrine system, leading to hypothyroidism, prostate hyperplasia and infertility. It affects the immune system leading to suppression of T-cell activity and decreased release of cytokines. It has harmful effects on the foetus when used during pregnancy.⁴¹

If it were possible it would be instructive to correlate the prevalence of Betel nut use with the incidence of birth defects in southern Vietnam, given that causation has been indicated.

For whatever reason betel nut is present as a factor in a number of neoplasm (cancer) SOPs for Australian and New Zealand Vietnam veterans. It appears to be more dangerous than all of the herbicides and insecticides. Of course exposure to Betel nut would be a deliberate lifestyle choice. Like tobacco and alcohol.

Confounding Factors

The above factors are just those relating to chemicals. In the SOPs for those conditions there are many more factors, including lifestyle factors.

When searching for causation many Vietnam veterans and their families immediately focus on Agent Orange as the cause of disease without considering other possible confounding factors. For some, the cause readily

⁴¹ Garg A, Chaturvedi P, Gupta PC. A review of the systemic adverse effects of areca nut or betel nut. *Indian Journal of Medical and Paediatric Oncology : Official Journal of Indian Society of Medical & Paediatric Oncology*. 2014;35(1):3-9. doi:10.4103/0971-5851.133702.

at hand might be the “*toxic soup*” of chemicals used in Vietnam; the “*toxic environment*”.

But in the case of cancers, for instance, the approximate causes of cancer death (factors) are tobacco (33%), diet including obesity and inactivity (30%), infections (18%), reproductive factors and hormones (7%), ionising radiation (6%), heredity (5%), occupation (3%), alcohol (3%), UV light (1%), pollution (<1%), medicine (<1%), industrial products (<1%), food additives (<1%)⁴².

The 2011 Omenn research quoted above amalgamates the results of seven studies (1981, 1989, 1991, 1996, 1997, 2000, 2013) that have reached similar conclusions. Omenn observed that obesity and inactivity was a growing problem. A recent (2017) paper has even suggested that obesity now rivals smoking as one of the leading preventable causes of cancer.⁴³

Cancer is a common disease. It is responsible for about 23% of all deaths in the Western world. Whether the cause is thought to be the Agent Orange contaminant TCDD, or one of the other chemicals used in Vietnam, or a combination of them all, the most common causes of cancer deaths are those related to lifestyle choices, and among the least common are those related to pollutants and environmental toxins.

That is also the case for many other diseases attributed to chemical exposure. And recent research indicates that PTSD may also be implicated as a causal factor in a number of conditions often attributed to toxic chemicals.⁴⁴

Summary & Conclusions

The term “*toxic environment*” was probably coined in New Zealand by a committee of politicians in 2004. It does not seem to be a term used in the research, or in legislation and regulation.

It refers generally to the pesticides (herbicides and insecticides) sprayed in Vietnam, and to various repellents and medications, which included:

- the tactical herbicides or “Agents” (mostly Orange, White and Blue);
- the commercial herbicides such as a Creosote/distillate mixture, Borate Chlorate, Gramoxone, Reglone, Tordon D and Paraquat;

⁴² Omenn, G., Preventable Causes of Cancers: Revisiting the 1981 Doll and Peto Report (PowerPoint), University of Michigan School of Public Health. 20 July 2011. Accessed at: <https://encrypted.google.com/#q=Omenn+Preventable+causes+of+cancers+revisiting+the+doll+and+peto+report>

⁴³ Sceneay, J., McAllister, S., The skinny on obesity and cancer, in Nature Cell Biology, 28 July 2017, 19(8): pp 887-888.

⁴⁴ For example, McLeay, S.C., et al, Physical comorbidities of post-traumatic stress disorder in Australian Vietnam war veterans, Gallipoli Medical Research Institute, University of Queensland, MJA 206 (6), 3 April 2017, pp 251-257.

- the insecticides Pyrethrin, DDT, Dieldrin, Lindane, Chlordane, Diazinon, and Malathion;
- the insect (mosquito, mite and tick) repellents such as DBP, DIMP and DEET; and
- the anti-malarial prophylactic medications Paludrine and Dapsone.

In this paper I do not deny that there were many chemicals (listed above) deployed for use at Nui Dat and elsewhere in Vietnam. The so-called “*toxic environment*”. I have attached papers (at Annex A and Annex B) by two of my Australian colleagues who document the widespread use of potentially dangerous insecticides at Nui Dat. However, I argue in this paper that there is no evidence that exposure to those chemicals caused serious health effects in New Zealand soldiers in Vietnam, or any health effects in Vietnam veterans, post-Vietnam.

To revisit the conclusions of previous papers,⁴⁵ there has been a great deal of scientific research into the claimed exposure and effects of Agent Orange and other tactical herbicides on the health of Vietnam veterans and their children. The research has been unable to establish evidence of individual or collective exposure of Vietnam veterans (other than those USAF and Chemical Corps personnel who mixed, stored and sprayed the defoliants) in sufficient dosage over sufficient time to cause any of the claimed health effects. Epidemiological studies have failed to find any significant increase of disease, disorder, disability or death in Vietnam veterans over and above the incidence in control groups and the general population.

In the case of Agent Orange, in the absence of evidence of exposure and causation, and in the absence of epidemiological evidence, policy makers have given veterans the benefit of the doubt by accepting a range of conditions as presumptively related to service in Vietnam⁴⁶. These are included in the presumptive list published on 30 August 2007 and now included in the Veterans Support Regulations 2014⁴⁷, and in the Australian Statements of Principles (SOPs)⁴⁸ now incorporated into New Zealand legislation and regulation.⁴⁹

There is no scientific evidence of any association between service in Vietnam and birth defects in the children and grandchildren of veterans. However in New Zealand there are five “accepted” or presumptive conditions for the children of veterans. For a full analysis of birth defects see my earlier paper, “*The Trans-generational Effect of Agent Orange*”.⁵⁰

Regarding the subject of this paper, the “*toxic environment*”, there has been little if any research into the effects of any of the other chemicals on

⁴⁵ Available at <https://putatara.net/agent-orange/>

⁴⁶ Himona, R.N., Presumption: The Bridge Across and Between Understandings and Misunderstanding, 29 April 2018. Available at <https://putatara.net/wp-content/uploads/2018/04/AO-Presumption.pdf>

⁴⁷ <http://www.legislation.govt.nz/regulation/public/2014/0369/52.0/DLM6316621.html>

⁴⁸ <http://www.rma.gov.au/sops/>

⁴⁹ <http://www.legislation.govt.nz/regulation/public/2014/0369/52.0/DLM6316734.html>

⁵⁰ Available at <https://putatara.net/wp-content/uploads/2018/04/The-Transgenerational-Effect-of-AO.pdf>

Vietnam veterans except for Dapsone. The Australian Dapsone study concluded that there were no lasting effects.⁵¹ The epidemiological research, that has found no increase in the incidence of disease, disorder, disability or death in Vietnam veterans over and above the incidence in the general population, indicates that the claims relating to the “*toxic environment*” are as unfounded as the Agent Orange claims.

Nevertheless the SOPs do include a few conditions (ischaemic heart disease, Hodgkin’s lymphoma, aplastic anaemia, anosmia, and Parkinson’s disease) that have exposure to certain insecticides as one possible contributing factor among many. However the combination of the required accumulation (hours) of exposure, the period over which the exposure is required to have occurred, and latency periods after exposure, would seem to preclude Vietnam veterans.

Those contributing insecticide factors are probably drawn from research into other occupational groups in the manufacturing and application of insecticides, given that there is no research relating to Vietnam veterans.

As with presumed exposure to tactical herbicides those SOP conditions with exposure to insecticides as contributing factors are presumptive in the absence of proof.

I conclude therefore that the use of the term “*toxic environment*” might be a useful popular description of the range of chemicals deployed in Vietnam. I suggest that we should note that other “*toxic*” elements in that environment included alcohol and tobacco, ticks and mites, and the two flying objects that caused many of the casualties; mosquitos and bits of metal. “*Toxic environment*” relating to chemicals has no basis as a causative factor in the health conditions of Vietnam veterans. Its use in that context is populist and emotive rather than factual and scientific.

⁵¹ Wilson EJ, Horsley KW, van der Hoek R. Dapsone exposure and Australian Vietnam Service: Mortality and Cancer Incidence. Canberra: Department of Veterans’ Affairs, 2007.

Insecticide deceit?: the truth about insecticides used at Nui Dat

By Dr John Mordike* (Vietnam veterans and professional historian)

Introduction

Over the last two years I have undertaken a study on the use of insecticides at the 1 ATF base at Nui Dat, the home of the Australian and the New Zealand fighting force in Vietnam. The most important finding of this study is that much of the truth about insecticide use by 1 ATF has never been revealed.

Taking a broad perspective, my study has revealed the roles played by the Army, the Department of Veterans' Affairs and the Department of Primary Industry in the examination and reporting of the use of insecticides by the Australian Army in Vietnam.

This article narrows the focus. It presents a synopsis of the findings of my study in relation to the use of insecticides at Nui Dat.

The article is based on primary source documents from Army's Vietnam records. The records are held by the Research Centre, Australian War Memorial, Canberra, and are available to the public for research under the terms of the Archives Act (1983).

After the passage of forty years and a Royal Commission in 1983-5, it is time the truth was revealed.

Developments at Nui Dat in 1970

In August 1970, the Officer Commanding Detachment 1 Field Hygiene Company at Nui Dat realised that very serious errors were being made with the use of insecticides. He brought his concerns to the attention of Headquarters 1st Australian Task Force (HQ 1 ATF), Nui Dat. In turn, HQ 1 ATF wrote to Headquarters Australian Force Vietnam (HQ AFV), located in Saigon, with the advice that:

*'All insecticides/pesticides containing **DIELDRIN** are to be withdrawn from issue, as in the Hygiene Officer's opinion **the use of this chemical in any form is dangerous to humans** ...'.¹*

The Hygiene Officer's advice about Dieldrin was correct. He subsequently advised that Dieldrin's toxicity was officially rated as '*Extremely Toxic*'.² Dieldrin was a very dangerous chemical and it posed real dangers for human health and the environment. But there were other very dangerous insecticides being used at Nui Dat, such as Chlordane, Lindane and Diazinon.

How toxic were these insecticides?

On 22 May 2001, delegates from 120 nations, including Australia, signed an international treaty banning **twelve of the world's most dangerous chemicals** in Stockholm. The dangerous chemicals were described as *'persistent organic pollutants [which] are among the most dangerous of all manufactured products and toxic wastes which cause fatal diseases and birth defects in humans and animals'*.³

Dieldrin was one of those chemicals. Chlordane was another.

Both of these insecticides were used regularly at the 1 ATF base at Nui Dat.

The Hygiene Officer's advice should have brought a stop to the use of Dieldrin, at least, in 1970. But it did not.

Army's Supply Policy on Insecticides was Flawed

Although Dieldrin and Chlordane were banned internationally in 2001, their extreme toxicity and danger to human health were known in the 1970s. Yet Army supply policy failed to reflect this.

When the Hygiene Officer's advice to cease using Dieldrin was considered at HQ AFV in August 1970, it was realised that Army's official supply policy placed no restrictions on the issue and use of Dieldrin and any other insecticides with *'extremely toxic'* and *'very toxic'* ratings. According to Army's documented supply policy, any unit could request these highly dangerous insecticides. Furthermore, personnel dispersing them required no qualifications or training.⁴ It was a very serious policy error.

My research has shown that, as a result of the policy and lack of awareness, *'extremely toxic'* and *'very toxic'* insecticides were dispersed at Nui Dat over a period of years in alarming volumes. An indication of the quantities involved will be given later in this article.

Remarkably, the realisation in August 1970 that the Army's supply policy was wrong produced no changes in the issue and use of Dieldrin, Chlordane and other dangerous insecticides at Nui Dat. The same insecticides were used again without restriction in 1971.

Two Classes of Insecticides

To assist in understanding what happened at Nui Dat, it is necessary to understand how insecticides are classified and how they work.

Insecticides are divided into two classes which dictate the way in which they are intended to be used:

- Knockdown Insecticides; &
- Residual Insecticides

Everyone will be familiar with Knockdown Insecticides. They are the insecticides that we use in our homes in pressure-pack spray cans. The insecticide is released into the air in the form of an aerosol or vapour. Knockdown insecticides are also dispersed by mosquito coils and, for larger areas, by fogging and misting. The insect comes into physical contact with the vapour or aerosol, generally when in flight. The pyrethrum in the spray paralyses the insect while another mild toxic element kills the insect. Because of their low toxicity, Knockdown Insecticides are relatively safe to use in areas of human habitation.

Residual Insecticides function differently. This class of insecticides is designed to be sprayed or applied directly to hard surfaces, sometimes plants but generally buildings, where it forms a film which eventually dries and crystallises. When the insect alights on, or crawls over, the treated surface and remains in contact with the treated surface for a period of time, it is poisoned and dies. To be effective, Residual Insecticides require a high degree of toxicity and they also need to be persistent, that is, they need to be long lasting. Only properly trained personnel should use these insecticides in special circumstances under close supervision.

Significantly, documents show that when the Hygiene Officer's representations were considered at HQ AFV in August 1970, it was realised that the Army had no bulk Knockdown Insecticide in its inventory.⁵ It never had. Therefore, all area spraying and fogging at Nui Dat was executed with Residual Insecticides alone. This supply problem was never rectified. The only Knockdown Insecticide available was in the hand-held pressure-pack spray can.

The following table lists the range of Residual Insecticides used by the Army in Vietnam. The toxicity rating of each – taken from the Hygiene Officer's documents at the time – are also shown.⁶ It will be noted that Dieldrin and Chlordane were two of the most toxic insecticides.

Residual Insecticide	Toxicity Rating
Dieldrin	Extremely Toxic
Chlordane	Extremely Toxic
Lindane	Extremely Toxic
Diazinon	Very Toxic
DDT	Moderately Toxic
Malathion	Slightly Toxic

Although Malathion was rated as '*slightly toxic*' in the 1970s, in July 2006, the United States Environmental Protection Agency reported the results of research that: "*Malathion ... is converted to its metabolite, **malaoxon** ... in insects and mammals*". The US EPA reported that tests on rats showed that Malaoxon was

'61x more toxic to adults [rats] than malathion'. When Malathion was dispersed it could convert to Malaoxon through oxidation in water treatment processes or through reaction with ambient air.⁷ It was inevitable that Malathion dispersed from aircraft over Nui Dat would settle on Rowe's Lagoon, the open water supply for Nui Dat. During the wet season, Residual Insecticides would also have found their way into the water supply through run-off.

Further Developments at Nui Dat in 1970

In September 1970, a month after he first raised the issue of insecticides, the Hygiene Officer wrote to HQ 1 ATF and HQ AFV with the advice that:

*'Residual insecticides are **dangerous poisons** and therefore are issued and used only by trained Army Health personnel.'*⁸

Apparently, the Hygiene Officer did not know that Army supply policy permitted the *'dangerous poisons'* to be issued freely to any unit and to be dispersed by unqualified personnel. The officer then explained briefly how Residual Insecticides worked and highlighted the problem with the use of insecticides at Nui Dat:

*'It has been the incorrect practice in the past to use Residual insecticides in a knock down capacity.'*⁹

Dispersing Residual Insecticides as though they were Knockdown Insecticides was a largely ineffective method of eradicating insects, but, significantly, as the Hygiene Officer pointed out to HQ 1 ATF and HQ AFV, it was **'somewhat dangerous to humans'**.¹⁰

Toxic insecticides could enter the human body through inhalation, ingestion and absorption through the skin.

As a result of the Hygiene Officer's advice, a senior medical officer was alerted to the problem with insecticide use at Nui Dat. He commented that:

*'It is obvious that previous insecticide practice in 1 ATF is [sic] unsound.'*¹¹

And again in his end-of-tour report the same medical officer noted that:

*'Use of insecticides in 1 ATF has not been subject to adequate control.'*¹²

Before leaving Vietnam on 23 December 1970, the senior medical officer directed the Hygiene Officer to prepare an AFV policy document on the use of insecticides.¹³

In the draft policy document, the Hygiene Officer recommended that:

*'the chlorinated hydrocarbons, CHLORDANE, LINDANE, DDT and DIELDRIN and any other of this group of insecticides be removed from the scale of issue to Aust forces in Vietnam.'*¹⁴

There is no evidence that the AFV insecticide policy document was ever promulgated. But, sadly, there is abundant evidence that the same errors with insecticide dispersal were made at Nui Dat during the next wet season in 1971; Residual Insecticides continued to be dispersed in a knockdown capacity. Indeed, it is evident the method of dispersal in 1971 was somewhat more dangerous for human health than it had been in the past.

The Wet Season of 1971 at Nui Dat

On 15 May 1971, the Commander of 1 ATF issued Routine Order Part 1, Serial 28, Number 111. The subject of the Order was *'Medical – Prevention of Insect-Borne Diseases'*.¹⁵

In the introductory paragraph, the Order explained that insect-borne diseases had caused high manpower loss in previous wet seasons and, therefore, a co-ordinated campaign had been designed for 1971 to combat the insect threat. Spraying insecticide from Australian aircraft was to be the centrepiece of the campaign. In previous years, US fixed-wing aircraft had sprayed insecticide over Nui Dat.

According to the Routine Order, the 1971 campaign was based on *'the latest medical advice'* and was to consist of the following measures:

- '(1) **Residual** spraying by fixed and rotary-wing aircraft initially at fortnightly and later at weekly intervals.*
- (2) **Residual** spraying of bunkers and building interiors.*
- (3) Ground fogging of unit areas with **residual** and knock down sprays.'*¹⁶

Remarkably, the campaign was based almost entirely on the use of Residual Insecticide and, of most concern, the aerial dispersal of Residual Insecticide.

Unfortunately, the Hygiene Officer who had warned in September – just 8 months previously - that Residual Insecticides were **'dangerous poisons'** and that using them as though they were Knockdown Insecticides was **'somewhat dangerous to humans'** was no longer serving at Nui Dat. He had returned to Australia on 7 April.

Veterans who served at Nui Dat in 1971 recall that, each week, the aerial spraying was executed by Iroquois helicopters from 9 Squadron RAAF. Documents show that the helicopter spraying commenced on 25 May 1971.

My research has revealed that the documented medical advice given to the Commander 1 ATF, like the Commander's subsequent Routine Order, failed to specify a particular insecticide to be used in the aerial and ground spraying or fogging dispersal campaign.¹⁷ The medical advice simply stated that the class of Residual Insecticides was to be used in both aerial and ground dispersal.

The lack of specific advice opened the door for the use of dangerous insecticides.

Two Veterans Speak Up

In 1982, one veteran, who served at Nui Dat with 3rd Battalion RAR as a member of the regimental hygiene squad, submitted a statutory declaration to a Senate Enquiry on pesticide use in Vietnam. The veteran said his duties *'included dispersing Malathion and **Diieldrin** with a swing fog device'*. He went on to explain that he *'did not dilute any chemicals'* during his service at Nui Dat from February to October 1971. *'Nor did any of the men I worked with to the best of my knowledge.'* The veteran continued:

*'We sprayed to kill mosquitoes, cockroaches, scorpions and snakes. The fog was dispersed under floorboards of tents, into tents occupied by soldiers, between sandbags around tents, around grease pits and rubbish cans, and kitchen waste areas.'*¹⁸

While undertaking this spraying, the veteran stated that he wore no protective clothing, nor did his workmates. The veteran also stated that after returning from Vietnam he had *'suffered from a number of medical problems including depression, nervousness and many bouts of irrational behaviour'*. His sons also had *'medical problems'*. The veteran died in May 2011, aged 66.

Another veteran, who had served with 12 Field Regiment based at Nui Dat in 1968-69 and again, in 1970, for a total of eight months with the Detachment 1 Field Hygiene Company at Nui Dat, gave evidence to the same Senate Enquiry observing that:

*'The high incidence of malaria and encephalitis caused operators and supervisors to lift concentrations to very high toxicity to achieve a kill. Many sprays were over three times the usual concentration and mixed into cocktails of different chemicals.'*¹⁹

This veteran died in 1994 at the age of 46.

What Quantities of Insecticides were used at Nui Dat?

On 15 October 1968, a Supply and Transport staff officer on HQ 1 ATF, wrote to the Deputy Assistant Director of Supply and Transport on HQ AFV, informing him of the results of a survey of certain expense supplies that were demanded by units at Nui Dat over a three-month period.²⁰ The quantities of insecticides being consumed at Nui Dat were included in the survey and they are presented in the following table.

Insecticide	Amount Used at Nui Dat in 3 Months - 1968	Toxicity Rating
Dieldrin	600 gallons	Extremely Toxic
Chlordane	520 gallons	Extremely Toxic
Lindane Powder	216 two-ounce cans	Extremely Toxic
Diazinon Liquid	600 gallons	Very Toxic
Diazinon Powder	300 pounds	Very Toxic
DDT	222 gallons	Moderately Toxic
Malathion	520 gallons	Slightly Toxic

The supply officer who completed the survey recommended that these usage rates be adopted to establish the working stock levels for supply units at Nui Dat.

These are alarming quantities. In a three-month period in 1968, 1,120 gallons of ‘*extremely toxic*’ Dieldrin and Chlordane alone had been dispersed at Nui Dat. Remember that both of these chemicals were among **the world’s twelve most dangerous chemicals** that were banned internationally in 2001.

It should be remembered that while the Australians were dispersing these quantities of insecticides at Nui Dat from ground-based equipment, US fixed-wing aircraft were also aerially spraying the base with either Malathion, or, perhaps, DDT, each fortnight.

The quantities of insecticides being used in 1968 were not an aberration. Other Australian supply documents from Vietnam show that in mid-1970 there were 285 gallons of Dieldrin in stock with a further 300 gallons on order, 35 gallons of Chlordane with a further 100 gallons due in, 100 gallons of Lindane Liquid with 300 gallons due in, and so on with similar amounts for the other Residual Insecticides.²¹

Why hasn’t this information come to light before?

Responding to the public controversy over the spraying of herbicides in early 1982, Army Headquarters, Canberra, established a research project to examine its 21,000 working files from the Vietnam war – the very same records used to write this article. While the original aim of the Army’s research project was to determine what herbicides had been used, the scope of the project was expanded to include insecticides and other chemicals that had been used by the Army in Vietnam. Although this was essentially an Army project, Department of Veterans’ Affairs also played a part in the research and writing.

The work of the research project was completed in May 1982. The findings were incorporated in a large, complex document which was known thereafter as the Army Report. But the original May version of the Army Report was subject to some amendment action before Minister of Defence Mr Ian Sinclair presented the report to Parliament in December 1982. Mr Sinclair had already explained in October that the *'original version of the report [had] been revised to add information where a more detailed description was felt necessary; [to] make minor corrections such as spelling and typographical corrections; and [to] make other editorial changes to improve the flow of the report.'*²²

The December version of the Army Report became an evidentiary base for information on the exposure of Australian veterans to Agent Orange, insecticides and other chemicals. Indeed, in relation to insecticides, the Army Report was used by, and quoted extensively in, the final report of the Royal Commission.²³

What becomes clear as a result of my recent study is that, on the subject of insecticides, the Army Report is a most unsatisfactory document. Indeed, I have discovered it to be riddled with obfuscation, omissions and misleading comments. For the sake of brevity, only three examples are considered here.

Example 1: Failure to Report Aerial Spraying in 1971 When the Army Report examined the contents of the medical advice given to the Commander 1 ATF in May 1971 to implement an insect eradication campaign, the report gave precedence to the ground spraying program and simply failed to mention the aerial dispersal element. Likewise, when the Army Report mentioned the Commander's subsequent Routine Order to implement the campaign, it reported that the order detailed *'the contents of a coordinated campaign against insect-borne disease'*. And that is all. The contents of the campaign were not reported.²⁴

Therefore, in a remarkable omission, the Army Report failed to mention the aerial spraying program of Residual Insecticides that was undertaken on a weekly basis using 9 Squadron RAAF helicopters. Aerial dispersal was the centrepiece of the whole campaign. This was a critical omission because it had implications for veterans' health.

The Royal Commission accepted the Army Report as it stood, so it too failed to report that RAAF helicopters had undertaken a weekly spraying campaign of Residual Insecticide at Nui Dat, commencing on 25 May 1971.

Thus Vietnam veterans were denied the possibility of Repatriation medical treatment and benefits for illnesses that may have been caused by exposure to these Residual Insecticides.

Example 2: Obfuscation over Amount of Dieldrin Dispersed Similar unsatisfactory reporting was evident when the Army Report detailed the quantities of insecticides dispersed at Nui Dat.

The Army Report claimed that it could report accurately the quantities of each insecticide used at Nui Dat on a monthly basis from December 1967 to September 1971 because a detailed set of 1 ATF accounting records existed. So the Army Report listed all of the insecticides in all their forms that were used at Nui Dat. For example, there were 133,557 large pressure-pack aerosol cans, 2,832 pounds of Diazinon powder, 123,502 three-ounce bottles of insect repellent and 2,360,350 packs containing 150 Dapsone tablets. It was also reported that 2,792 gallons of Malathion and 2,940 gallons of Chlordane were dispersed by Australians at Nui Dat. Yet in the midst of all this accounting accuracy, it was remarkable that Dieldrin alone was the exception.

In the Army Report that was submitted to Parliament in December 1982, the amount of Dieldrin issued at Nui Dat over the four-year period was simply listed as 430. But 430 what? The units of quantity were not mentioned.²⁵

To claim that detailed Army accounting records did not designate what quantity of Dieldrin was being issued, while all other insecticides were accurately accounted for, is nonsense. While I have never been able to locate the detailed accounting records cited in the Army Report, I have found a number of documents in the Army records held by the Australian War Memorial that show that Dieldrin came from a US source in 5 gallon drums and that the Australian unit of issue was the gallon.

Further highlighting the unsatisfactory reporting of the quantity of Dieldrin issued, readers will also recall that the survey of usage rates at Nui Dat reported that 600 gallons of Dieldrin had been issued at Nui Dat in just a three-month period in 1968. The Army Report, however, did not mention this documented fact.

Again, the Army Report misled the Royal Commission. The final report of the Royal Commission reproduced the usage rates listed in the Army Report showing that 430 had been issued at Nui Dat, while noting '*quantity not specified*'. Obviously, the commission took no further action to find out the truth on this matter; it simply accepted the Army Report without question²⁶.

Example 3: A Significant Deletion in the Army Report As already explained, there were two versions of the Army Report. The first was completed in May 1982, but, before being submitted to Parliament in December, some amendments were made.

In the following extract from the original May version of the report, I have emphasised in bold type certain words. These words were used to describe the 1 ATF Hygiene Officer's initial concerns about the use of insecticides at Nui Dat:

*'The concern, **that untrained personnel were apparently using toxic insecticides without any knowledge of concentrations, dilution factors, human toxicity factors and general safety precautions**, resulted in the intended publication in Routine Orders of information on safe insecticide practice.'*

Note : A draft routine order was discovered but it is not known whether it was actually published.²⁷

This statement was a succinct, realistic assessment of the situation.

But the statement was amended before submission to Parliament. And the amendment was certainly beyond the scope of the revisions explained to Parliament by Minister of Defence Mr Ian Sinclair in October.

The words I emphasised in bold type from the original May version were deleted and the following statement substituted in the December version:

'The 1 ATF Hygiene officers [sic] concern that practices for the use of toxic insecticides needed improvement resulted in the intended publication in Routine Orders of information on safe insecticide practice.'

Note : A draft routine order was discovered but it is not known whether it was actually published.²⁸

Who deleted the words *'that untrained personnel were apparently using toxic insecticides without any knowledge of concentrations, dilution factors, human toxicity factors and general safety precautions'*?

On 25 November 1982, Mr Phill Thompson, National President of the Vietnam Veterans' Association of Australia put out a press release claiming that Department of Veterans' Affairs officers were *'currently revising'* the original May version of the Army Report before its submission to Parliament in December.²⁹ Further evidence from an Army officer working in Army Office at that time supports this claim.

Whoever the culprits, it is clear they intentionally removed vital information describing a longstanding dangerous misuse of toxic insecticides. Why? The original words highlighted negligent practice in the use of insecticides that could have led to searching questions during the Royal Commission. It is also clear that the original words would have helped veterans pursue claims for medical treatment and compensation.

A Concluding Comment

The above examples raise key questions. Was information about the use and misuse of toxic insecticides deliberately omitted or deleted from the Army Report and to what end? Were any omissions and deletions made to protect those guilty of possible negligence or to deny exposed veterans grounds for their lawful benefits? And exactly what part did the Department of Veterans' Affairs play?

Given the rates and methods of dispersal of Residual Insecticides and their toxicity and persistence in the environment, it is clear that the Nui Dat base was an increasingly toxic and dangerous environment for human habitation. Consequently, it is highly probable that the health of Australian and New Zealand veterans was adversely affected. I believe that a thorough examination of the morbidity of these veterans is warranted.

As a final comment, it is certain that the Australian Army will never again use herbicides – at least not on the scale and in the way that they were used in Vietnam – but the Army will be using insecticides. It is essential that the protocols developed for the use of these chemicals consider the safety and well-being of soldiers as the first priority.

John Mordike

3 September 2013

*Dr John Mordike is a Vietnam veteran and professional historian. He graduated from the Royal Military College in 1966 and served in Vietnam as the Officer Commanding 12 Field Regiment LAD. He has a BA and LittB from the University of New England and a PhD from the University of New South Wales. He is the author of *'An Army for a Nation : A history of Australian military developments 1880-1914'* and *"We should do this thing quietly" : Japan and the great deception in Australian defence policy 1911-1914'*.

¹ Captain A.M. Szoeki, ST Officer 1 ATF, to HQ AFV, 11 August 1970, 'RAASC Supplies: Insecticides/Pesticides, Restrictions of Use', AWM 98, Item R990/162/5, Australian War Memorial.

² Captain T.J. Nicholson, Hygiene Officer, to ADMS, HQ AFV, 'Insecticides 1 ATF 1/70', December 1970, AWM 98, Item 454/1/1, Australian War Memorial.

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⁹ Captain T.J. Nicholson, Hygiene Officer 1 ATF, to DAQMG, 'Insecticides – 1 ATF', 30 September 1970, para. 3.a., AWM 98, Item R990/162/5, Australian War Memorial.

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²⁴ Army Report, May 1982, Book III, Chapter 2, Part 1, Section 2 'Australian Policy', para. 27, p. 3-126; & Army Report, December 1982, Book 3, Chapter 2, Part 1, Section 2, 'Australian Policy', para. 27, p. 3-128.

²⁵ Army Report, May 1982, Book III, Chapter 2, Part 1, Section 2 'Australian Policy', para. 27, p. 3-126; & Army Report, December 1982, Book 3, Chapter 2, Part 1, Section 2, 'Australian Policy', para. 27, p. 3-128.

²⁶ Royal Commission on the Use and Effects of Chemical Agents on Australian Personnel in Vietnam, Final Report Volume 1: Introduction and Exposure, July 1985, page IV-71, Table 22.

²⁷ Army Report May 1982, Book III, Chapter 2, Part 1, Section 2, '*Australian Policy*', para. 25, page 3-125. Emphasis added.

²⁸ Army Report December 1982, Book III, Chapter 2, Part 1, Section 2, '*Australian Policy*', para. 25, page 3-127. Emphasis added.

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Rampant & Uncontrolled use of Insecticides in Australian Army Bases in South Vietnam

By Robert Denner (Dorrigo NSW, 10 October 2013)

I read with relief and satisfaction John Mordike's article "Insecticide Deceit; - the truth about insecticides used at Nui Dat" because finally someone has looked in detail at the rampant and uncontrolled use of residual insecticides at 1ATF base Nui Dat.

My experience was direct; I was the OC Det 52 Supply Platoon RAASC, a sub unit of HQ 26 Coy RAASC from July 1968 to December 1968 at Nui Dat. Prior to that I was the Supply Officer of 25 Supply Platoon RAASC at 1ALSG Vung Tau from December 1967 to June 1968.

When Australian Forces deployed to Vietnam we took only a very limited range of expense supplies, the logistics were that we would use items of US supply.

During my time at 1ALSG, we received, stored and issued to units in ALSG and Det 52 Sup Pl at Nui Dat (for 1ATF Units) just about every conceivable type of residual insecticide. (Herbicides were not an RAASC item, RAE were responsible for that category).

The US Army Supply System was incredibly generous with expense supplies, and their depots would normally issue in pallet lots. There were no restrictions imposed by the US or Australian Army Logistics/Supply/Medical Staff to restrict, control or monitor the use of the residual insecticides which included the following;

- Dieldrin
- Chlordane
- Lindane
- Diazinon liquid & powder
- Malathion
- DDT Concentrate

Apart from the RAASC Supply units, I am not aware that any unit was required to account for the US items.

US containers had a general description of the contents and a recommended use. Much of the lettering was faded and indistinct. Dilution tables were also on the containers. There were some hazard warnings on the sides but the abundance of the chemicals overshadowed all other considerations.

Pallet loads of the US items were stored at Vung Tau in both covered and open storage. Spillages were frequent due to rusted out cans being in the open and from being deck cargo en route from the USA. The atmosphere in the covered stores at Vung Tau was polluted and vaporous. Soldiers had difficulty working in these areas for any length of time because of poor airflow ventilation and pools of chemicals on the floor which was usually swept out by local labour. Normal duty dress was hat, shorts, socks and GP boots.

My recollections are that every unit in 1ALSG had large quantities of these chemicals for their hygiene and insect control activities at 1ALSG and unqualified and unsupervised soldiers liberally applied the chemicals to all buildings, and barracks.

Resupply of these chemicals to units of 1 ATF was effected through Det 52 Sup Pl RAASC. RAASC vehicles would transport full pallet quantities to Nui Dat, however some mixed pallets were often received. The chemicals were stored in an open 3 sided

shed. The same problems of broached containers existed and spillages were allowed to run off in the rain because there was no alternative. There were no published safety precautions issued for the handling of these items apart from some local measures using rubber gloves, while still bare chested!

I recall many instances when soldiers had to jump into rain water filled 44gallon drums to wash off when the 5 gallon insecticide drums burst.

Once issued to the units and echelons of 1ATF, what happened to these residual chemicals, the quantity and method of application and the safety precautions would have been up to the hygiene NCOs and duty staff to use these items to soak tent floors, sandbag walls, weapon pits, walk ways and the walls of buildings....my premise is that a complete lack of supervision was the norm because of the quantities available. Personnel dispersing them required no qualifications or training.

A change to the routine and a high moment of each week would be when the fogging truck from 8 Field Ambulance would cruise the unit lines in Nui Dat fogging everything in range. One would also look up when the airborne fogger helicopter regularly sprayed the entire Task Force Base. No one was advised what was being sprayed, nor any precautions that may have been necessary. It was not an issue that the Staff addressed.

When I think of the blokes who may have died as a result of this ignorance and lack of investigation....I can name so many from both the units that I served in.....I believe that it is time that someone accepted responsibility.