

ISSN 0114-9199

ISBN 0-908881-06-1

August 1993

Working Paper No 4

**A HISTORY OF
NEW ZEALAND CHEMICAL WARFARE
1845 - 1945**

**by
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CENTRE FOR PEACE STUDIES

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ABSTRACT

A history of New Zealand involvement in chemical warfare (CW) is presented, based mainly on official files preserved in the NZ National Archives.

Possibly the first time CW was used anywhere in the British Empire was at Ohaeawai pa, in 1845. New Zealand forces used chemical weapons in Belgium and France during World War I on about the same scale, relatively speaking, as did British forces, and about as indiscriminately. Toxic phosgene and non-toxic tear gas seem to have been the main agents used. In at least one instance NZ artillery seems to have bombarded a town containing civilians.

New Zealand apparently first became interested in acquiring its own reserve stocks of gas shell about the time the Geneva Protocol on gas warfare was signed in 1925. Whether such stocks were actually acquired is still not clear. New Zealand actively supported retention of the 'right' of chemical retaliation when the question of banning CW entirely was raised at the 1932 Disarmament Conference.

During World War 2 New Zealand was involved in research, development and production of CW weaponry. New Zealand acquired a considerable quantity of chemical weapons. One stockpile may have accompanied the 3rd Division to the Pacific. The other main stockpile was stored at Belmont between 1942 and 1946, and included

112 770	rounds of 25 pounder mustard shell
15 300	gas bombs for 4.2 inch mortar.

The ultimate fate of this CW arsenal is not clear. Some may have been transferred to US forces in the Pacific. In 1946 some 1500 tons of 25 pounder shells and 20 tons of mortar bombs were dumped off Cape Palliser. This would be equal to about 135,000 shells and 2200 gas bombs. A further 200 tons were dumped in Hauraki Gulf. Other gas munitions may have been dumped as late as 1957. RNZN ships apparently continue to carry tear gas munitions for riot control operations 'in aid of the civil power'. New Zealand possibly provided defoliants for the Vietnam war.

This report finishes by discussing the implications for New Zealand of becoming a party to the Chemical Weapons Convention.

ACKNOWLEDGEMENTS

This is part of a larger study which will include working papers on New Zealand's involvement in biological warfare and in military defoliation. Peter Wills initiated the project, provided much of the source material for it, and assisted in many other ways. The study was supported financially by a PADET grant awarded by PACDAC, and by a grant from Greenpeace New Zealand. The work was carried out at the Centre for Peace Studies, University of Auckland, and at the Wellington office of Peace Movement Aotearoa. I am grateful for the excellent facilities and service provided by the NZ National Archives and its staff in Wellington.

TABLE of CONTENTS

1	Introduction	1
2	A Note on Terminology	2
3	British CW policy	3
4	CW in the New Zealand wars	7
5	New Zealand, CW, and World War 1	10
	5.1 NZ experience of CW	10
	5.2 NZ use of CW	16
6	Between the wars	21
	6.1 Post-war rearmament	21
	6.2 The Geneva Protocol	23
	6.3 Build-up toward war	26
7	Evolution of US Pacific CW policy in World War 2	28
	7.1 Defensive Preparations	28
	7.2 Retaliatory Phase	29
	7.3 Tactical (first strike) Phase	30
	7.4 Strategic Use	32
8	NZ CW research and production in World War 2	33
	8.1 CW research of mostly defensive significance	33
	8.2 Research with offensive potential	34
	8.3 Offensive CW production	36
	8.4 Gas trials in Australia	37
	8.4.1 The trials	37
	8.4.2 NZ participation	38
9	New Zealand CW policy in World War 2	40
	9.1 Defensive policy	41
	9.1.1 Anti-gas defence on the home front	41
	9.1.2 Defensive military preparations	42
	9.2 Retaliatory policy	44
	9.3 Tactical phase -- first use decision	47
	9.4 Strategic phase	52
10	New Zealand's CW stockpile in World War 2	52
	10.1 Storage	53
	10.2 Disposal	55
	10.3 Environmental consequences	57
11	New Zealand and CW arms control after World War 2	61
	11.1 Defoliants	62
	11.2 Tear gases	63
	11.3 NZ & CW disarmament	64
	11.4 New Zealand and the CW Convention	68

1 INTRODUCTION

The use of 'poison gas' and 'germ weapons' in warfare seems to have attracted more abhorrence than any other form of warfare¹, although nuclear arsenals have generated more fear and elicited better-organised opposition. Biological warfare (BW) has, relatively speaking, been a non-issue in so far as it has seldom been actually used, and even less frequently used effectively. Chemical warfare (CW) on the other hand has been used, and there is plenty of evidence that it can be militarily effective. Fortunately there has been a marked reluctance to use CW weapons since the conclusion of World War 1, even by those states possessing them.

CW is currently something of a global issue, for various reasons. New technological, policy, and propaganda initiatives make chemical weapons seem more of a threat now than they have been since the early seventies. The 1980-88 Gulf War (Iraq v. Iran) saw the most extensive use of toxic CW since World War 1, and the 1991 Gulf War (US et al. v. Iraq) seemed to produce more scare propaganda and scare stories about gas warfare than any conflict since World War 1. On the positive side Geneva negotiations have at last led to agreement on a multi-lateral Chemical Weapons Convention (CWC) which should come into force in a couple of years.

CW has recently been a Pacific Basin issue too, in particular because of concern about possible hazards posed by incineration of old US chemical weaponry on Johnston Atoll. The South Pacific Forum protested when the US shifted even more chemical weaponry from Germany to Johnston Atoll. Following from this has been increased awareness of the fact that a substantial portion of the useable US chemical arsenal is stored on this small atoll in the central Pacific.²

Possibly the first recorded instance of CW by British forces occurred in New Zealand in 1845. New Zealand had and used lethal gas in World War I, in violation of the 1899 Hague Convention. New Zealand has and was ready to use mustard gas shells and bombs against the Japanese in World War 2. New Zealand was involved in CW research and testing during World War 2, in particular to adapt its chemical arsenal to use in a

¹ A good general, non-technical introduction to the subject is Robert Harris & Jeremy Paxman, *A Higher Form of Killing: The Secret Story of Gas and Germ Warfare*, Chatto & Windus 1982, hereafter referred to as H&P.

² Peter Wills, 'US chemical warfare - the Pacific connection', *Peacelink*, May 1991, 'Doug Graham hasn't a clue: US chemical weapons in the Pacific', *Peacelink*, April 1992.

tropical environment. This report looks at CW activity in or by New Zealand from 1845 until the end of World War 2 and relates it to the CW policies and activities of Britain and the United States.

Apart from the World War 1 usage, NZ's CBW activities have been unsuspected and undescribed until now. The CW history which follows has been pieced together mostly from old External Affairs and Armed Services files in the NZ National Archives. These files are identified by the prefix 'NA' in the footnotes.

2 A NOTE ON TERMINOLOGY

The terminology of chemical warfare becomes complex if one attempts to use terms which are correct both from a chemistry/physics viewpoint and from the military viewpoint. Most war 'gases' in fact are not gases - some are liquids, some are solids. While acknowledging this, this study will continue to use the term 'gas' in its popular meaning - it makes sense in so far as most chemical agents act through the lungs - and refer for example to 'mustard gas' and 'tear gas'. More generally the chemicals which are the essence of chemical warfare will be referred to as 'agents'.

The equipment containing the agent, such as shells, bombs, rockets, spraytanks - will be called 'munitions', and the equipment used to launch the munitions - artillery, aircraft, rocket launchers etc will be called 'delivery systems'. All of these items will loosely be referred to as 'weapons' or 'chemical weaponry'.

The distinction between 'agents' and munitions needs to be kept quite clear, particularly in considering quantities. A munition is likely to contain agent only one fifth of its weight. A stockpile can be expressed in 'munition tons' but is more meaningfully described in terms of 'agent tons'.

The abbreviation CW in this report refers, as context demands, to chemical weapons or chemical warfare. Similarly, CBW means the general subject of chemical and/or biological weapons/warfare while CBW is referring specifically to both chemical and biological weapons/warfare.

There is much debate as to what chemical agents are covered by the term chemical warfare. In this report herbicides and riot control agents are included but incendiary agents and smoke are excluded.

3 BRITISH CW POLICY

Before examining New Zealand CW activity it is helpful to summarize British CW policy and activity, in the context of which the New Zealand activity is best understood.

British interest in CW is conventionally described as beginning in 1855, when the British War Department was shown shells filled with cacodylic oxide, a toxic substance containing arsenic, mixed with an incendiary substance. In the same year it was also suggested that sulphur dioxide, produced by burning sulphur, should be used in the siege of Sevastopol. The British Government decided that the effects of the chemicals would be so horrible that no honorable combatant would use them. The first actual British use of CW, apart from a possible instance described in the next section, was in the Boer war, when toxic shells containing picric acid were used.³

Germany initiated the use CW in World War 1 with the use of chlorine and was also the first to use the far more lethal phosgene and 'the king of war gases', mustard. Britain and its allies had no compunction about following the German initiatives as rapidly as their less-developed chemical industries would allow. Britain was ahead of Germany in certain aspects of CW delivery technology.

At the conclusion of World War 1 a British Government committee reported 'with no shadow of doubt' that 'gas is a legitimate weapon in war'. A cloak of secrecy then descended over the subject. Estimates of gas casualties in World War 1 were allegedly revised downwards⁴ to give credence to claims that gas was a humane form of warfare. It was argued that it was more civilized to kill a man with gas than with bullets, and the

³ R Clark, *The Silent Weapons*, McKay 1968, p. 15; S Hersh, *Chemical and Biological Warfare: America's Hidden Arsenal*, McGibbon & Kee, 1968.

⁴ H&P, p. 34.

popular press was accused of having scare-mongered over CW and exaggerating its horrors.⁵

CW research facilities established at Porton Down during the War continued to do research on offensive CW. The official policy, as the Chiefs of Imperial General Staff (CIGS) advised the Dominions in 1923, was that the UK would not use gas unless the enemy did first. "At present we have no units for offensive gas warfare"⁶

Britain continued to use CW. Arsenic smoke was used at Archangel during the British intervention in the Russian civil war, and Britain supplied gas shell to the anti-Bolshevik forces.⁷ Britain sent mustard and phosgene to the North-west Frontier, India, and may have used it against the Afghans in the early 1920s.⁸ One British document of the period preserved in NZ Army files recommends further development of tear gases because they "would be very effective against savages or semi-civilized troops, without the cry of inhumanity being raised."⁹

After Britain signed the Geneva Protocol [See sect. 6.2 below] secrecy about offensive CW research increased. The official history of Porton describes how after 1925 the Offensive Munitions Department had to change its name to 'Technical Chemical department', the term 'chemical Warfare' was dropped in favour of 'chemical defence', and "thereafter all offensive work was done under the heading 'Study of chemical weapons against which defence is required'."¹⁰

Believing Germany and Italy to be preparing to wage CW, Britain began covertly re-arming in 1936, and built a new plant for mustard production. Delivery from spray-tanks carried by high-altitude bombers was envisaged. Meanwhile the Germans were

⁵ The Problem of Chemical and Biological Warfare, Volume 1: The Rise of CB Weapons, Stockholm International Peace Research Institute (SIPRI), 1971 (hereafter referred to as 'Prob 1'), ch. 3 'Popular attitudes towards CBW, 1919-1939'.

⁶ NA, AD-11, 4/5. See also sect. 6.1 below.

⁷ Prob 1, p. 141.

⁸ H&P, p. 43; Prob 1, p. 142.

⁹ NA, AD-11, 4/5.

¹⁰ As quoted by H&P, p. 47.

developing far more effective and lethal nerve gases, which were to remain unknown to the Allies until after World War 2 ended.

In 1940 Britain prepared to use gas against any invasion of German troops. Churchill was particularly enthusiastic about this and pushed hard for mustard production to be stepped up. Britain had 13,000 agent tons by November 1941, with 6000 people employed in its production.¹¹ Britain and its allies, believing enemy resort to gas inevitable, established CW munitions dumps in every theatre of war around the world, including those in which NZ forces operated such as North Africa.¹² Britain had one such dump of gas shell and bombs in Singapore, and was put to considerable trouble disposing of it before the Japanese arrived.¹³

At the same time the USA was also stepping up CW production, motivated by fears of Japanese capability, fears which subsequently turned out to be without foundation.¹⁴ The US could afford to be even more enthusiastic about CW than Britain because it had not signed the Geneva Protocol, and it did not fear retaliation against its own cities, which were beyond range of Japanese aircraft. President Roosevelt was strongly opposed to CW, but was prevailed upon by his advisers and military chiefs to allow the accumulation of enormous stocks and the preparation of plans for first use, especially against Japan. By the end of the war the US had 135 000 agent tons of CW, as against the 7500 tons possessed by Japan.¹⁵

Late in the war Churchill demanded CW attacks against Germany in retaliation for the V-1 flying bomb attacks. He wrote to his military chiefs:

It is absurd to consider morality on this topic.... I want a cold-blooded calculation made as to how it would pay us to use poison gas, by which I mean principally mustard.... We could probably deliver twenty tons to their one.... One must not be bound within silly conventions of the mind whether they be those that ruled in the last war or those in reverse which rule in this....

¹¹ H&P, p. 111.

¹² The most notorious evidence for this was the disaster at Bari, Italy in November 1943, when a US ship loaded with mustard blew up. A thousand local people were killed.

¹³ H&P, p. 119.

¹⁴ After the war it was discovered that Japanese capability and enthusiasm for CW had peaked about 1935, when Japan was using it against China [H&P, p. 118.]

¹⁵ H&P, p. 118.

.... We could drench the cities of the Ruhr and many other cities in Germany in such a way that most of the population would be requiring constant medical attention.... If we do it, let us do it one hundred per cent.... I want the matter studied in cold blood by sensible people and not by that particular set of psalm-singing uniformed defeatists which one runs across now here now there. Pray address yourself to this.¹⁶

The Chiefs of Staff were not convinced of the efficacy of CW alone, and were particularly deterred by the prospect of German retaliation. They did however investigate the feasibility of combined CBW - 'an unrestricted use of chemical and biological weapons', but ended up favouring the use of BW alone - specifically anthrax. For various reasons, including Germany collapsing sooner than expected and the successful development of the atom bomb, Britain and its allies never had the opportunity to try out CBW in World War 2.

At the end of the War the bulk of the British CW was loaded on ships and dumped at sea off the coast of Norway. At the same time the allies were starting to argue over which of them should take over the just-discovered German nerve gas secrets. As things turned out the Russians got most of the German nerve gas factories, but Britain and the US got most of the Nazi expertise. The US went on to develop new nerve gases and to manufacture vast quantities of them, as well as keeping most of its World War 2 stocks intact.

Britain and Canada entered into what was called the Tripartite Agreement with the US for continued CW development. This virtually merged British and US CW programmes while Canada contributed its Suffield testing facilities. Britain discovered the nerve agent VX in 1952, which was shown to be many times more lethal than the Nazi nerve gases, and its production was undertaken by the US.¹⁷ After discovering that conventional tear gas was not very effective against 'fanatical rioters' Britain invented the far more potent CS. The formula was handed over to the US under the Tripartite Agreement, and the US used 7000 tons of it against the Vietnamese.

Britain undertook limited production of nerve gas at Nancekuke, Cornwall. In 1956 Britain renounced the possession of CW, but continued 'the search for incapacitating and

¹⁶ As quoted in H&P, pp. 127-129. See also Richard Lamb, *Churchill as War leader: Right or Wrong?* Bloomsbury 1991, pp. 308-311.

¹⁷ H&P, p. 184.

new lethal gases'.¹⁸ By the 1970s just the defensive testing alone was consuming 25 000 test animal lives a year.¹⁹

Australia joined the club in 1965, contributing its Innisfail test facilities and carrying out research on shellfish and jellyfish toxins, and the arrangement became known as the Quadripartite Agreement. New Zealand also became involved about this time as a junior partner. Just what New Zealand contributed is not known, but in November 1980 the director of Britain's Porton Down claimed that the main contribution of both Australia and New Zealand was the testing of equipment developed in Great Britain and the United States.²⁰

4 CW IN THE NEW ZEALAND WARS

For what it is worth, there was one reported attempt to wage CW during the New Zealand wars of the mid-nineteenth century.²¹ It was described by Robert Hattaway, a colour-sergeant in the British forces under Colonel Despard which attacked Hone Heke's Ohaeawai pa (fortification) in Northland in midwinter of 1845.

The pa, under the command of Kawiti, was very strongly constructed. The two guns and two mortars of the British

produced no apparent effect, even after several days. The aim and direction of the cannon shots striking the outer palisade was excellent, but they became embedded in the rough timber. The shells were also useless, being too light to penetrate the earth through the mass of earth [sic] which protected them.... Our commanders were at their wits' end.... Our ingenious artillerymen thought of the empty shell cases that should have contained live shells. Could they be converted into stench balls, and fired by the mortars in a vertical direction by means of short time fuses? We sent two old soldiers to assist in their manufacture. Great expectations were entertained by our artillery officers of the success of this scheme.

The shells contained some poisonous substance the effect of which was expected to deprive the rebels of all animation, and leave them a prey for the European victors. As

¹⁸ H&P, p. 183, quoting an official summary of a Tripartite Conference in September 1958.

¹⁹ H&P, p. 227.

²⁰ H&P, p. 175, quoting an interview with Dr Rex Watson.

²¹ I am indebted to Chris Pugsley for bringing this incident to our attention.

day by day passed away and nothing occurred to disturb the natives in their stronghold it was concluded that the project had been a failure. It was never ascertained what number of stench balls had been fired.²²

Hattaway's colourful account is quite detailed and was based on a diary kept at the time, but was published 44 years after the event. Comparing his account with the diary of his commanding officer, Major Cyprian Bridge,²³ indicates there were several errors of date in the Hattaway account, and the attempted CW attack may not be accurately described in it. Bridge himself gives a more detailed day-by-day account of the British bombardment, but fails to make any mention of the stench-balls. Several other contemporary accounts²⁴ also fail to mention them. James Cowan, however, writing 33 years after Hattaway,²⁵ appears to have had access to details of the incident additional to those of Hattaway, suggesting that there may be independent confirmation of the Hattaway account hidden away in some archive. Cowan, after quoting Hattaway, added:

This curious experiment, the first and only instance of the use of poison-gas in New Zealand, was attended with no better success than the other means adopted for the capture of the pa. The composition of the "stench-balls" remains a mystery; unknown also is the number of these shells delivered to the Maoris by vertical fire. The expectation was that the mortars, with their 45° angle of fire, would land the poison-shells within the trenches or the dugouts, where their explosion would produce stupefaction as well as consternation. Wherever they exploded, they failed to produce any noticeable ill effect upon the Maoris.

It is difficult to suggest what sort of toxic material may have been available in the New Zealand bush for improvisation of CW weapons by an inadequately equipped and provisioned force of 600 British soldiers, local volunteers and friendly Maoris. There are

²² R Hattaway, *Reminiscences of the Northern War* [pamphlet: reprinted from the NZ Herald], Auckland, 1889.

²³ The handwritten diary of Major Cyprian Bridge, commanding officer of the 58th Regiment, *Journal of events on an expedition to New Zealand commencing 4th April 1845*, is preserved in the Turnbull Library, Wellington.

²⁴ those cited in J Belich, *The New Zealand Wars and the Victorian Interpretation of Racial Conflict*, Auckland University Press, 1986.

²⁵ J Cowan, *The New Zealand Wars: A History of the Maori Campaigns and the Pioneering Period*, Wellington 1922, v. 1, pp. 58-9.

no easily-gathered toxic substances occurring naturally in the bush, and it seems unlikely that the column of soldiers carried any great quantity of toxic material in their meagre stores. From the account it is hard to determine whether the "stench-balls" were simply that - or whether they were really intended to have toxic effect.

If the incident did occur, then it may be the first recorded attempt to use CW in or by the British empire. It happened ten years before the next known instance of CW being considered, and half a century before the first actual British use. [See sect. 3 above.] A British military historian has contrasted the ineffectiveness of the British stench balls with the daily weakening of the British forces through rain, hunger, and rum.²⁶

It is interesting to compare this with the use of CW in World War 1. Belich has pointed out²⁷ that Ohaeawai pa was equipped with fighting trenches, traverses, communication trenches, and artillery-proof underground bunkers not so very dissimilar to those of the Western Front in World War 1. At Ohaeawai about 400 artillery rounds had failed to make a breach in a fortification defended by only 100 warriors. This ratio of four projectiles per enemy combatant was the same as that used in the initial British bombardment of German positions on the Somme in June-July 1916.²⁸ These 400 rounds were directed at a fortification that was only about 100 metres square.

The British had not attacked anything as sophisticated and effective as the Ohaeawai pa previously, and the defeat they suffered at Ohaeawai from a mere 100 or so Maori defenders was comparable to that suffered by the Light brigade at Balaclava ten years later. It is little wonder that prior to their final futile charge the British tried to circumvent the impenetrability of the Maori earthworks and palisades by similar CW techniques to those of 1915 in France and Belgium. But the necessary resources were not available.

²⁶ M Barthorp, *To face the Daring Maori*, Hodder & Stoughton, 1979.

²⁷ Belich, 1986, pp. 235-6, 295-7.

²⁸ Gerry Barton, 'A day at the Somme', *North & South*, July 1991.

5 NZ, CW, AND WORLD WAR ONE

5.1 NZ experience of CW

In World War 1 NZ troops were in the thick of CW almost from the moment they arrived in Europe from the disaster of Gallipoli. Gas warfare became the norm on the Western Front, and New Zealand conformed with that norm.

The first use of CW in World War 1 was the German release of chlorine from thousands of pressurized gas cylinders against French forces near Ypres on 22 April 1915. New Zealand forces were at this time about to land at Anzac Cove, Gallipoli. By mid-July New Zealand forces at Gallipoli were taking 'every precaution' against gas.²⁹ "A new kind of bomb introduced by the Turk and emitting evil smelling fumes' was interpreted as heralding an impending gas attack in September. Primitive masks consisting of cotton waste wads impregnated with anti-gas chemicals were issued. There was also a limited supply of primitive anti-gas 'hypo' helmets. Anti-gas instruction was given. 'A languid interest was taken in this instruction, but gas precautions were never effectually organised at Anzac. The wind was mostly westerly, Turkwards.'"³⁰

When the New Zealand troops reached France it was a different matter. As soon as the NZ forces reached the front, in May 1916, at Armentieres, they began serious preparations against the possibility of chlorine gas attacks.

Gas alarms were frequent:

The gas alarm was given by means of sirens ... known as 'Strombos' horns, the beating of improvised gongs, such as a length of railway iron, or by firing coloured rockets from the trenches; church bells in the vicinity were tolled to warn the civilians; the whole dismal chorus of sound very disquieting - especially as these alarms took place at night.³¹

Many of the alarms were false, and many of the German gas releases from cylinders were rendered ineffective by wind dispersal or wind drift away from the New Zealand lines. The hypo helmet, effective only against chlorine, was replaced by the 'P.H.' helmet,

²⁹ Lt Col A D Carbery, *The New Zealand Medical Service in the Great War 1914-1918*, Whitcombe & Tombs, 1924, p. 66.

³⁰ Carbery, p. 119.

³¹ Carbery, p. 167.

effective also against phosgene²². According to Burton 'After sweltering a few times in slimy evil smelling 'P.H. helmets' the alarm of 'gas' came to be looked on as rather a bad joke'.³² The NZ troops complained about the British-issue helmet, a sort of chemically-impregnated balaclava with celluloid eyepieces. In hot weather the supposedly-protective chemicals dissolved in the sweat and produced skin burns.

One of the minor horrors of the contraption was that it was a most unpleasant damp sticky thing to carry about; being hygroscopic it soon gathered moisture ...; by seepage the phenyl-hexamine compound oozed onto the jacket making the hands most unpleasantly sticky and the garment disreputable.³³

Germany had begun using gas artillery shell (as distinct from releasing gas from cylinders) earlier in the year. Delivering gas by artillery right into the enemy lines considerably reduced the dependence on favourable wind direction. Mixing gas shell with high explosive (HE) shell increased the confusion and disruption. Burton wrote that 'the evolution of the gas shell changed everything'.³⁴ The New Zealand Division first came under serious attack from gas shell at the Somme, where lachrymatory agent (ie tear gas) was also experienced for the first time.³⁵ The first gas attack of any consequence took place on 16 September 1916.

Thistle Alley, the communication trench ... was heavily shelled with H.E. and lachrymatory gas; a few shells containing what was deemed to be some other type of gas compelled the parties at the advanced A.D.S. to work in goggles and helmets for a time.³⁶

The New Zealanders suffered seriously from gas in February 1917. This was their first experience of phosgene which had been introduced by Germany the previous December and which was six times as lethal as chlorine.

On a clear moonlit night our forward billets at Fleurbaix were shelled with a mixture of phosgene and high explosive, and the right brigade ... had their front and support line freely plastered with 75 mm. gas shells fired from trench mortars. Either the men did not realise that gas was being used or there was delay in rousing the sleepers, or in some instances the expiratory valves of the small box respirators ... were found to be frozen together; all these and some other

³² O Burton, *The Auckland Regiment NZEF 1914-15*, Whitcombe & Tombs, 1922, p. 153.

³³ Carbery, p. 166.

³⁴ Burton, 1922, p. 153.

³⁵ Burton, 1922, pp. 145, 153.

³⁶ Carbery, p. 204.

causes, the combination of H.E. with the gas shells, led to a large number of casualties by gassing. The ill effects of the gas were not at first noticed, it was late before the matter was reported, and many of the gassed men had walked considerable distances before they were received into the ambulances.... The most startling feature of the whole occurrence was the fact that the men did not complain of any ill effects until many hours after gassing, and that the onset of grave symptoms, in the fatal cases, was abrupt. The cyanosis, restlessness, dyspnoea and collapse, and ultimate death within a few hours, of young robust men, shocked the medical officers in attendance in this their first experience of the extraordinary lethal effects of phosgene in high concentration. The treatment adopted was that laid down in the manuals - oxygen, camphor, and atropine. Only those who have struggled hour after hour with a fatal case realise how futile these remedies were.³⁷

From now on gas was used extensively against the New Zealanders, and in some engagements up to 25% of casualties were due to gas. More stringent anti-gas measures were introduced.

All troops who had been exposed to gas were to be relieved at once, and any showing even the mildest symptoms were to be treated urgently as stretcher cases. All those who had been in the gassed area were enjoined to rest quietly for some hours afterwards.³⁸

Gas casualties were numerous at Messines, when the German shelling was favoured by a steady gentle easterly wind,³⁹ and from then on much more care was given to anti-gas equipment and training. Mustard gas was first used against British troops in mid July at Ypres. A couple of weeks later it was used against New Zealand trenches at La Basse Ville.⁴⁰ The New Zealand narratives made little comment about mustard, which elsewhere was described as changing the nature of the war. Mustard could be fatal if taken into the lungs, but its main military value was the high casualty rates caused by its blistering effect on the skin. Gas masks were no longer sufficient protection and gas-proof clothing had to be worn. Gas caused 7.2% of British Empire casualties prior to the

³⁷ Carbery, pp. 253-4. Compare this with the more clinical description of phosgene effects in sect. 5.2.

³⁸ Carbery, p. 254.

³⁹ Col. H Stewart, *The New Zealand Division 1916-1919: A Popular History Based on Official Records*, (published under NZ Government authority by Whitcombe & Tombs), 1921, p. 183.

⁴⁰ Carbery, p. 325; Stewart, p. 228.

introduction of mustard, and 15% thereafter. Because of the lower toxicity, however, death rates amongst gas casualties went from 3.4% down to 2.4%.⁴¹

After Messines the so-called small box respirator, similar to the more familiar World War 2 gas mask, replaced the hated P.H. helmets. Burton notes that the new respirator 'made a most excellent pillow' while the satchel was 'useful for the carrying of everything from socks to love letters'.⁴² Eventually the New Zealand troops became quite comfortable under gas attack:

On the night of the 20th our area was heavily shelled with gas shells. I donned my gas-helmet, and in spite of the surroundings lapsed into short spells of sleep, waking from time to time to find myself breathing in the prescribed manner, inhaling through the nose and exhaling by the mouth valve.⁴³

Gas was used against New Zealand for the rest of the war, apparently with increasing intensity and frequency.⁴⁴ Burton wrote that, after Messines, the Germans made a prodigal use of gas. All the woods, the hollows, the roads, tracks and camps in the forward areas were systematically deluged with phosgene and chlorine.⁴⁵

However, as far as can be determined from the sparse references to the subject, the gas attacks declined in effectiveness as New Zealand 'gas discipline' improved.

The Artillery were the most frequent target of German attacks, gas being seen as particularly effective for artillery neutralization. NZ artillerymen got used to wearing masks for hours at a stretch.

No overall statistics for casualty rates due to gas seem to be available, but an indication can be got by sampling military hospital bed statistics for the period July 1917 - June 1918, which spans Ypres, Passchendale, and the 1918 German spring advance.

⁴¹ Prob 1, p. 46.

⁴² Burton, 1922, p. 153.

⁴³ A Aitken, *Gallipoli to the Somme: Recollections of a New Zealand Infantryman*, OUP, 1963, p. 146.

⁴⁴ Annual agent tonnages of CW shell used by Germany from 1915 to 1918 were 1400, 5900, 13,600, 27,300. CW accounted for 6.4% of all shell fired by Germany in the War. [Prob 1, p. 36.]

⁴⁵ Burton, p. 163.

Selected hospital statistics for NZ
forces in World War 1⁴⁶

period	wounds in action	venereal diseases	shell shock	trench foot	gas poison	gas burn
Jl-Dc 1917	4795	1118	84	196	630	65
Ja-Mr 1918	888	558	23	80	351	4
Ap-Jn 1918	1964	462	19	28	83	1

An analysis of 'diseases etc for which members of the New Zealand Expeditionary Forces have been returned to New Zealand up to and including February 28 1918' covered a total of 13 402 casualties. The analysis was very detailed, and out of the 13 402 casualties listed those attributed to gas totalled only 85 (6%) as follows:

Suffocation from gaseous poisons	83
Burns or chemical injuries to eye	2

Other casualties included

Gunshot wounds to lower extremities	1527
Injuries to organs of generation	30
Tuberculosis of the lung	332
Venereal diseases	236 ⁴⁷

The initial conclusion from these figures is that medically CW was less of a problem than VD, but the time period may not be representative, and the above figures take no

⁴⁶ "Reports of the Statistical Department, NZ Medical Service, London, 1916-1918", NA, WA-1/4, 5.27.

⁴⁷ Surgeon general, Director of Medical Services to the Hon Minister of Defence: A return showing diseases etc, 19 April 1919, NA, AD-1, 64/50.

account of deaths, or of cases treated at forward dressing stations etc. Further research is needed.

Gas does not figure in many of the stories told by World War 1 veterans to Nicholas Boyack and Jane Tolerton.⁴⁸ One man told how he was gassed on the Somme and:

The next morning when I woke up I was coughing and spluttering and pretty poorly and I reported to the MO [Medical officer] and was evacuated to hospital. How long I spent there I can't remember, but I personally never suffered any ill effects from the gas.⁴⁹

At least one other victim had much stronger views:

I had phosgene myself.... And anyone who uses chemical warfare doesn't get my vote now.... You see, its bad enough young men having to go and get bashed and lose limbs, without chemical war. You know, I think, well, there are other ways of killing men than gassing them and making a mess of them - because all the tender parts of the body are eaten away with the mustard gas....⁵⁰

Overall, and surprisingly, there seems to be very little written about the use of gas against New Zealand soldiers in World War 1, either in contemporary narratives,⁵¹ or in retrospective and historical⁵² accounts. There is quite literally more complaining about the weather (and the mud!) than there is about gas, and there is more invective directed against gas masks than against gas attacks. Gas drill was highly unpopular, and on occasion extra gas drill was imposed as a punishment.⁵³ One is left with the impression

⁴⁸ N Boyack & J Tolerton, *In the Shadow of War: New Zealand Soldiers Talk about World War One and Their Lives*, Penguin, 1990.

⁴⁹ Boyack & Tolerton, p. 60.

⁵⁰ Boyack & Tolerton, p. 190.

⁵¹ eg. Colonel H Stewart, *The New Zealand Division 1916-1919: A popular history based on official Records*, (Published under NZ Government authority by Whitcombe & Tombs), 1921; Ormond Burton, *The Auckland Regiment NZEF 1914-1915*, Whitcombe & Tombs, 1922.

⁵² A Aitken, *Gallipoli to the Somme: Recollections of a New Zealand Infantryman*, OUP, 1963; O E Burton, *The Silent Division: New Zealanders at the Front 1914-1919*, Sydney, 1935; Unpublished autobiography of O E Burton, MS 0438, folder 59 in Turnbull Library, etc. The writings of Ormond Burton are of particular interest since, after serving in the Great War he became one of New Zealand's leading pacifists.

⁵³ Burton, p. 215.

that the New Zealand infantryman was far more concerned about having a limb blown off by high explosive than about having to wear a gas mask for several hours at a time.

This may represent some sort of kiwi stoicism or reticence, or it may indicate that after the horrors of Gallipoli gas warfare was not as hideous as contemporary and subsequent popular opinion made it out to be. Two factors may explain the relatively matter-of-fact manner in which the NZ troops apparently put up with gas attacks.

The first is that the New Zealand troops did not arrive until a year after the traumatic experience of the first big chlorine release at Ypres, when allied troops were totally without protection. Allied propaganda portrayed this as an act of inhumanity contrary to all codes of civilized behaviour, one of many atrocities that only Germans would commit. Many exaggeratedly gruesome accounts were published.⁵⁴ By the time the New Zealanders arrived the Allies were themselves using gas, and the barbarity of it had to be played down.

The second factor is that the NZ troops were fortunate in that they were never subjected to chemical attack for which they did not have reasonably adequate countermeasures, which had been developed in response to earlier attacks suffered by others. For them gas attack was mostly an inconvenience which imposed the discomfort and inconvenience of gas masks etc for hours at a time. The overall history of CW in World War 1 was an alternation of offensive initiative and defensive counter-initiative. Each offensive move would initially produce horrific casualties, but within a few weeks the countermove - usually better filters or new absorbents - would be introduced, and the new CW capability was neutralized. By fortunate chance the New Zealanders were never in the wrong place at the wrong time with the wrong equipment, as far as gas was concerned.

5.2 New Zealand use of CW in World War 1

In World War 1 New Zealand forces were part of British Empire forces, and NZ artillery fired at the enemy more or less whatever the British provided for them to fire. Thus the history of New Zealand CW is basically the same as the history of British CW. British Empire forces fired 450, 3000, and 5600 agent tons of CW shell in the years 1916, 1917 and 1918 respectively, and the NZ artillery presumably fired its proportional share. Gas

⁵⁴ 'Popular attitudes towards CBW, 1919-1939', ch. 3 in Prob 1, p. 231.

made up 2.2 % of all the shell fired by Empire artillery.⁵⁵ In total the British Empire used 14 000 agent tons of CW (artillery and cylinder) during the war, as compared with the 52 000 agent tons used by Germany, or the 26 000 tons used by France.⁵⁶

The first British CW operation against Germany was a cylinder release of chlorine in September 1915 near Loos, Belgium. Due to a wind change, some of it drifted back onto the British lines, causing 2000 casualties.⁵⁷ New Zealand forces at this time were still at Gallipoli, with no CW munitions available to them, despite the wind blowing 'mostly ... Turkwards'.

The allies first used phosgene in June 1916, at the Somme.⁵⁸ By August 1918 between 20 and 30 % of all British ammunition was filled with gas. In September the first British mustard reached the front - just two months before the armistice.⁵⁹ New Zealand seems never to have had access to it.

CW was an artillery specialty, and the principal source of published information on NZ CW in World War 1 is the official history of the NZ Artillery.⁶⁰ Even here the information is sparse - the artillerymen were obviously more concerned about the gas being 'thrown' at them by the 'Hun', than curious about the gas they were firing at German lines. In addition it seems that use of gas by the New Zealanders rarely had any obvious influence on the outcome of any particular engagement. According to Burton:

Gas as a lethal weapon was never much of a success. Both sides could manufacture the ingredients cheaply and to saturation point, but the counter was just as cheap and effective. On both sides the careful use of respirators ... meant almost 100% security.⁶¹

⁵⁵ Prob 1, p. 36.

⁵⁶ Prob 1, p. 128.

⁵⁷ H&P, p. 12.

⁵⁸ H&P, p. 19.

⁵⁹ H&P, p. 32.

⁶⁰ Lieut. J R Byrne, *New Zealand Artillery in the Field: 1914-1918*, Whitcombe & Tombs, 1922.

⁶¹ O E Burton, unpublished autobiography, Turnbull Library, MS 0438, fldr. 59, ch. 13.

The New Zealand forces sailed from Egypt for Marseilles in April 1916. The Artillery went to Havre for re-equipping and then took over a portion of the front near Armentieres. According to the official account they were to have first used gas (composition unspecified, but released from cylinders) and smoke in support of an Australian attack on their flank on 19 July. The wind, however, was not favourable.⁶²

NZ batteries first fired gas shell on the Somme front, in September 1916, using 4.5 inch howitzers. This was in support of the British advance in which tanks were used for the first time.⁶³ Early in October while west of Flers they shelled the town of Bapaume, using captured German gas shell.⁶⁴ In mid October it was reported that German artillery fire was being kept well below its normal rate due to high explosive shelling by heavy artillery and gas shelling by the NZ 4.5 inch howitzers.⁶⁵

In June 1917 'the German positions in front of Messines were liberally gas-shelled'⁶⁶. On 10 August:

Our howitzer batteries commenced to carry out gas shell bombardments, chiefly with asphyxiating [presumably phosgene] shell on selected points such as suspected headquarters etc. Retaliation was fairly prompt and in kind....⁶⁷

In September New Zealand shelled the eastern approaches to Passchendale with gas in the course of an attack. In December the New Zealand forces returned to Ypres to prepare for the big attack Germany was expected to launch after the Russians had made peace on the Eastern Front. When this attack came in March 1918 the artillery had three important successive roles. The first was 'counter-preparation' in which all enemy infantry assembly areas were thoroughly plastered by all guns. The second was the neutralization of enemy artillery, particularly with gas shell. Thirdly, during the actual assault the artillery responded to SOS requests for supporting fire from the various sectors of the NZ lines.⁶⁸

⁶² Byrne, p. 118.

⁶³ Byrne, p. 129.

⁶⁴ Byrne, p. 138.

⁶⁵ Byrne, p. 146.

⁶⁶ Byrne, p. 166.

⁶⁷ Byrne, p. 182.

⁶⁸ Byrne, p. 227.

In the final stages of the war when the Allies were pursuing the Germans through still-settled French territory, the use of gas shell was stopped 'to conserve the safety of the French inhabitants'.⁶⁹

The chief toxic gas used by New Zealand was phosgene. One of the more restrained descriptions of the effects of this gas is as follows:

Having inhaled a lethal dosage of phosgene, the victim at first feels nothing more than a rather mild irritation of the eyes and throat. This generally passes quickly and for a period between two hours and three days he may have almost no other complaints, and may even feel mildly euphoric. During this latent period however, a catastrophic oedema⁷⁰ of the lungs is building up, which is accelerated by any form of physical exertion. Quite suddenly the situation is reached when an adequate supply of oxygen is prevented from reaching the lungs, and thereafter the victim quickly goes into a state of collapse, his breathing hurried, shallow and spasmodic, his chest constricted, his lungs spewing up a yellowish expectorate, in a state of extreme weakness and fearfulness until unconsciousness and death supervene.⁷¹

Policy on employment of gas was laid down by the British, and there are numerous orders and other documents on gas policy in the NZ Divisional Artillery files. Secret notes⁷² from the General Staff filed in August 1916 began cheerfully:

Shells filled with toxic chemicals are now being sent up to Armies and it is hoped that very shortly the supply will be sufficient to enable a liberal use to be made of this form of bombardment.

.... Gas shells can be used against all enemy positions, but they are most effective for counter battery work and for shelling villages, woods, and other enclosed positions

⁶⁹ Byrne, p. 279.

⁷⁰ ie an accumulation of fluid in the lungs.

⁷¹ Prob 1, pp. 41-43, footnote. See also effects of German phosgene on NZ soldiers in Section 5.1 above.

⁷² 'SECRET C.B. 816: Notes on the Employment of gas shells' 23 August 1916, NA, WA-20, 3/6/63.

and then described the gases available and their uses:

SK⁷³ ... lachrymatory but not lethal.

PS⁷⁴ Lachrymatory and lethal.... quicker and more painful [than SK].

GBR [also known as] White Star or Collingite⁷⁵.... lethal, very slightly lachrymatory ... a powerful asphyxiant ... affects the lungs even in very small dilutions.

Jellite⁷⁶ ... highly lethal but is not asphyxiant....

.... From the above it can be seen that where it is intended to render a place uninhabitable for a long length of time strong concentrations of S.K. should be used. Where it is intended to get a quick effect, followed immediately by an attack, Jellite is the most suitable. Where it is intended to temporarily place a garrison out of action and follow up somewhat later by an attack P.S. is probably the best. Where it is merely to cause the greatest number of casualties White Star is the most effective....

Further 'notes' filed in June 1917⁷⁷ amplify the role of PS and introduce a new gas:

PS Lachrymator and lethal agent. Penetrates German mask and induces vomiting.

CG⁷⁸ Very lethal. If 'P.S.' and 'C.G.' bombs are fired from one gun alternately, the former will make the enemy vomit and remove his mask while the latter then kills; this is apart from, and in addition to, any surprise effect that may be obtained.

Nowhere in any of the NZ World War 1 material so far examined, is there any reference to the 1899 Hague convention, and it seems there was no attempt to observe its prohibitions or even to pretend to be doing so. The material quoted above indicates that New Zealand was quite explicitly violating the Hague ban on "the use of projectiles, the object of which is the diffusion of asphyxiating or deleterious gases".⁷⁹ New Zealand was not a signatory to

⁷³ ie Ethyl iodoacetate. [Prob 1, p.45]

⁷⁴ ie chloropicrin. [Prob 1, p. 47]

⁷⁵ A mixture of 75% phosgene and 25% stannic chloride. [Prob 1, p. 48.]

⁷⁶ Not identifiable.

⁷⁷ 'Notes on the offensive use of gas and methods of gas discharge', 4 June 1917, NA, WA-20/3, 3/5/62.

⁷⁸ ie phosgene. [Prob 1, p. 47.]

⁷⁹ The Problem of Chemical and Biological Warfare, v. 2, CB Weapons Today, Stockholm International Peace Research Institute, 1973 (hereafter Prob 2'), p. 17.

that it had already carried out a survey of production possibilities in New Zealand and decided that the Ivon Watkins plant could not produce in the quantities needed by the USAF. The Embassy was however interested in using an Auckland Company called Polymer Proprietary (now A C Hatrick) which 'on a Japanese supply of material, could produce half a million gallons per year'. Whether or not the Polymer proposal came to fruition is not known. Polymer had no production plant, and would merely have been mixing chemicals shipped separately from Japan, so this was obviously a 'laundering' operation that was being proposed, Japan being prevented by its Peace Constitution²⁴² from exporting armaments.

The New Zealand Government has attempted to suppress information about the defoliant supply proposals, both at the time and subsequently. The Ministry of Defence will not allow access to the relevant files. The Select Committee which investigated the matter in 1989-90 (in response to pressure from Vietnam veterans worried about health effects) professed in its final report to be unable to establish whether defoliant production took place or not.

11.2 Tear Gases

As far as is known the only chemical munitions held by the NZ armed forces are tear gas grenades carried on RNZN ships. These seem to date back to 1948, when the British Admiralty authorised naval landing parties to use 'tear smoke grenades N° 92'. The Chief of Naval Staff at that time pointed out to the Minister of Defence that because the Royal New Zealand Navy had responsibility 'for law and order in certain United Kingdom dependencies' a decision by the NZ government was needed on 'whether RNZN ships should embark an outfit of these grenades (considered the most humane method of quelling riots) for use in aid of a civil power outside New Zealand'.²⁴³ Presumably the UK dependencies in question were Fiji, Solomons, New Hebrides and Pitcairn. These dependencies have all, with the exception of Pitcairn, since become independent. It is hard to imagine that the possibility of riots on Pitcairn would justify carrying tear gas, yet RNZN ships have continued to carry tear gas until at least as recently as 1987. In that year a petty officer from the RNZN frigate Canterbury was convicted for discharging a

²⁴² ie the Constitution imposed on Japan by the US as a condition of the Peace Treaty ending the US occupation of Japan.

²⁴³ NA, EA-1, 80/6/2, 'Use of tear gas in aid of the civil power'.

the Hague convention of 1899, but, as a Dominion of the British Empire was presumably bound by the British signature.⁸⁰

6 BETWEEN THE WARS

6.1 Post-war rearmament

After World War 1 New Zealand shared in the global revulsion against CW. Neither CW munitions nor protective equipment were retained to any extent. Despite concern about Japanese naval power and expansionism the Great War was supposed to have been the war to end all war, and New Zealanders chose to believe that the Singapore base would defend New Zealand.

This complacency was short-lived. Early in 1925 New Zealand advised the UK Chiefs of Imperial General Staff that 'this Dominion possesses no Anti-gas equipment' and asked for some. The CIGS agreed to send some, and suggested that New Zealand initiate manufacture of more. Australia's Brig. Gen. Thomas Blamey provided information about Australian CW preparations. New Zealand sought and received further detailed information from Australia. Amongst other things Australia had the ability to make 826 tons of chlorine per year, and the potential to make several thousand tons.⁸¹ In May 1925 Britain advised its dominions that it intended to adopt a formula of endeavouring to obtain from any enemy an 'engagement' not to use offensive gas as a weapon of war. If such an engagement were not obtained Britain would feel at liberty 'to act according to circumstances'. This policy found its way into the British Army Field Service Regulations which applied to the armies of the self-governing dominions, including New Zealand. The Committee on Imperial Defence decided that

... all service schools and commands be authorized to study the employment of offensive gas, since the study of offensive gas is necessary to the study of protection against gas, and also in order that we may be in a position to retaliate immediately.... [Furthermore,] ... steps should be taken to ensure the bulk production of gas should necessity arise.

⁸⁰ J Goldblat, *Agreements for Arms Control*, Stockholm International Peace Research Institute, 1982, p. 121.

⁸¹ NA, AD-11, 4/5.

The NZ Prime Minister advised Britain

that while deploring the necessity for such measures the Government of New Zealand is in complete agreement with the formula.... and also with the recommendation of the Committee of Imperial Defence'.⁸²

The NZ Chief of General Staff advised his Minister that 'C.W. and Anti-gas Measures' had been under consideration at NZ GHQ for some time.⁸³ An NZ Chemical Warfare Committee was set up on 27 May 1925 - about 3 weeks before the Geneva Protocol was signed. It was:

to act as an advisory body.... with a view to the development, to the utmost extent, of both the offensive and defensive aspects of Chemical Warfare.⁸⁴

On 14 July 1925 a 'Chemical Warfare Policy for New Zealand' was submitted to the Minister of Defence by the military. It proposed (a) anti-gas training, (b) provision of anti-gas equipment for all personnel in the NZ military, and,

since an enemy using gas would possess an overwhelming advantage over troops not equipped with offensive gas ... (c) provision of means for conducting offensive gas warfare (notably gas shells), and the training of the troops therein.

The report remarked further:

Expert opinion is unanimous that purely defensive measures are inadequate and dangerous, in that a study of the offence is necessary to develop the defensive, and should a nation use gas, its opponent must, in the interests of self preservation, be prepared to retaliate heavily and immediately. The investigation of resources for gas production, partial accumulation of stocks and training of personnel are therefore obligatory.⁸⁵

⁸² NA, AD-11, 4/1.

⁸³ NA, AD-11, 4/1.

⁸⁴ Committee - Chemical warfare - Appointment of personnel, NA, AD-1, 22/330.

⁸⁵ NA, AD-11, 4/5. The similarity to the earlier British statement about the necessity of studying the offensive in order to develop protection will be noted.

A secret memo for the Ministry of Defence on 26 July 1926 noted that GHQ had prepared a scheme for building up munitions stockpiles in NZ which provided for

certain expenditure [sic] on ... chemical shell ... when more definite information as to ... the storage and keeping qualities of chemical ... shell is available'.⁸⁶

Whether or not any chemical shell in fact was procured is not clear from the files. In practice most of the effort that followed seemed to concentrate on anti-gas preparations rather than offensive stockpiling. In particular the report recommended procurement of 30,000 gasmasks. By 1927 this procurement was under way.⁸⁷

6.2 The Geneva Protocol

In May 1925 the Conference for the Supervision of the International Trade in Arms and Ammunition and in Implements of War convened in Geneva. On 17 June this conference approved a Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare - more commonly referred to as the Geneva Protocol.

The British General Staff opposed ratification of the Protocol, maintaining in a cable that found its way into NZ Army files that they 'adhere to attitude that gas is effective and we ought to retain freedom to use'. The policy to be taken by the Empire towards the Geneva Protocol was discussed at the Imperial Conference in London in November, attended by the NZ Prime Minister.⁸⁸ Britain, like many other nations, was in no hurry to ratify, and in 1927 announced it was not in favour of ratifying until all other important powers had agreed to do so. Ratification was on the agenda of the May 1929 Imperial Conference but in March 1929 the German Reichstag voted for ratification, putting Britain on the spot. Britain proposed to ratify with the reservation that its signature would not be binding with respect to opponents who failed to observe it - in other words Britain decided to interpret the Protocol as prohibiting only first use. This view was put to New Zealand in a 'Secret special telegram' which added:

⁸⁶ NA, AD-11, 4/5. See also similar memo filed in AD-11 11/10 'Ammunition-Reserves of artillery and SAA to be held in New Zealand SECRET.'

⁸⁷ NA, AD-11, 4/5.

⁸⁸ NA, AD-11, 4/1.

In favour of ratification it has been urged that (one) our own ratification with ... reservations would leave us free to continue any necessary preparation measures against gas attacks (two) So long as we do not ratify we give an enemy some excuse for using gas against us....

Britain proposed that the matter be discussed at the next Imperial Conference in May. New Zealand cabled back that it was in favour of ratification with reservations identical to those proposed by Britain.⁸⁹ However the situation 'developed with unexpected suddenness': Germany ratified without reservations on 25 April, and Britain felt forced to ratify without consulting further.⁹⁰ Britain's ratification on behalf of the Empire was deposited on 9 April 1930. New Zealand's accession, with identical reservations to those of Britain, was notified on 24 May 1930.⁹¹

In the wake of the Geneva Conference the League of Nations in 1932 held a further 'Conference for the Reduction and Limitation of Armaments', usually referred to as the Disarmament Conference. New Zealand was one of the 62 countries participating. One of the major items the conference considered was extending the Geneva Protocol to ban possession and manufacture of chemical weapons as well as use.⁹² Various delegations declared that any prohibition which was not absolute would lose much of its force, and there were pressures to remove the 'no first use' qualification to the Protocol. The Conference established a Bureau which on 12 November considered a draft text which amongst other things proposed

4. The state against which chemical incendiary or bacteriological weapons have been employed shall in no circumstances retaliate by the use of the same weapons.⁹³

Britain, which was on the Bureau, did not comment on this text.

⁸⁹ NA, EA-1, 108/10/11, 26 April.

⁹⁰ NA, AD-11, 4/1.

⁹¹ The Problem of Chemical and Biological Warfare, v. 4, CB Disarmament Negotiations, 1920-1970, Stockholm International Peace Research Institute, 1971 (hereafter 'Prob 4'), pp. 342-4. Note however that Prob 1 [p. 270] regards Britain as following the stand of New Zealand and others.

⁹² Prob 4, pp. 72-174.

⁹³ Prob 4, p. 140.

On 20 November 1932 the NZ Government received from the UK Government a 'Secret-special' telegram which called on New Zealand support for retaining the right of chemical retaliation:

Circular B. 136. S E C R E T. The Bureau of Disarmament Conference has been discussing the methods of enforcing the prohibition of the use of Chemical Warfare, and two points have arisen on which the United Kingdom delegate has been compelled to put in reservations against the view taken by other members of the Bureau.

These points concern (one) Retaliation and (two) Sanctions.

(One) Retaliation. All members of the Bureau except the United Kingdom have been in favour of laying down rule that a State against which chemical weapons have been employed shall in no case retaliate by use of the same weapons. It is argued that to permit retaliation would be to weaken prohibition by making it no longer absolute and by giving States a legitimate excuse for continuing to make preparation for chemical warfare.

....

The general view of His Majesty's Government in the United Kingdom is that it would not be possible to agree to forego in all circumstances use of right of retaliation if poison gas were used against this country or to entrust lives of British subjects to vague and distant sanctions such as those which apparently are contemplated.

At the same time it is appreciated that it would be very embarrassing if the United Kingdom representative(s) on the Bureau were placed in the position of being the sole opponent(s) of the proposals which (however impracticable) were supported by all other members of the Bureau.

The matter is one of concern to all members of the British Commonwealth and the United Kingdom Government would appreciate a very early expression of the views of Dominion Governments on the questions involved.

The Major General commanding NZ forces composed a reply for the Prime Minister which indicated total support for the British position:

.... His Majesty's Government in New Zealand, while in full accord with any agreement to prohibit the use of chemical warfare, or to endeavour on the outbreak of war to obtain the agreement of Enemy Governments to abstain from its use, is in agreement with the general view of His Majesty's Government in the United Kingdom that it would not be possible or advisable to agree to forego in all circumstances the use of the right of retaliation.⁹⁴

⁹⁴ NA, AD-11, 11/1, November 1932.

Fortified with similar affirmations by its other loyal Dominions, Britain returned to the Bureau meetings and in 1933 introduced a draft convention banning CW manufacture or possession and use but allowing retaliation. The Conference accepted this draft in May 1933, although there were several objections to the provision for retaliation. The new Convention never came into force however: In 1936 the League of Nations postponed further meetings of the Disarmament Conference, and from then on the various members returned to the more serious business of rearming and preparing for World War 2.⁹⁵

With admirable foresight the NZ Army Department began to accumulate a file of ratifications to the Protocol. This fat file was to be closed in September 1939 with the declaration by Germany that it would continue to observe the Protocol during the war which New Zealand and others had just declared against it.⁹⁶

6.3 Buildup toward war

Gas in war

... the position points to a drift towards a competition in gas arsenals which should be unthinkable in our twentieth century civilisation.... Competition in gas manufacture ... leads to the very catastrophe most of the nations would be glad to avoid.... The horrors and frightfulness indicated through the possibilities of chemical warfare should strengthen the determination to outlaw war, and should form a public opinion that will eventually break down the barriers of international distrust and suspicion, and help to secure worldwide peace.

Editorial in the Westport News 16 March 1929.

By 1929 another world war was starting to look inevitable. The Dominion carried an item on 29 November 'by Electric Telegraph from London' reporting on a peace movement meeting there at which it was predicted that the next war would start between 1935 and 1940: 'It would be a war against civilians, and thus the trenches would possibly be the easiest place to be.'

It was widely assumed that the coming war would, like the last, involve gas attacks. The NZ Farmer's Union and its Women's Division were amongst the organizations which lobbied the Government to increase its preparedness against gas. In 1932 the NZ

⁹⁵ Prob 4, p. 172.

⁹⁶ NA, AD-1, 284/1/2.

Defence HQ began supplying the Police with British material on dealing with gas attacks on the civil population.⁹⁷ New Zealanders noted the Italian use of gas against Abyssinia with disapproval.⁹⁸ Fear of gas attack was so universal that even New Zealand did not seem quite immune.⁹⁹ A circular on air raid precautions was prepared in 1935 which included instructions on responding to gas. The Red Cross and Saint John Ambulance organizations began offering courses in anti-gas preparations.¹⁰⁰ In 1936 the Emergency Precautions Committee (EPC) of the Organization for National Security (ONS) was established. The EPC drafted a memo on air-raid precautions and anti-gas measures in July 1937,¹⁰¹ and in April 1938 a joint ONS/Chiefs of Staff (CoS) committee promulgated 'Anti-gas precautions for the civil population'. Attacks were expected to be light. 'Fortified towns, i.e. Auckland, Wellington and Lyttelton, could be attacked with less illegality than the remainder.' There would be no formal training. Police, fire brigades etc would be invited to send representatives to army training sessions. It was thought that '... a public statement, made in sober terms and deprecating sensationalism, would go far to reassure the country'.¹⁰²

Some people needed reassuring. A Miss I J Scull, of Palmerston North, wrote to the Minister of Internal Affairs in April 1939:

Sir,

I should like to be supplied with gas masks and a bomb-proof shelter for a household of 12. Can you do it? Yours truly....

After getting the run-around she repeated her request, adding a postscript: 'Don't say 'apply to the mayor' because I've done it.' The Minister replied that it was not government policy to supply gas masks to civilians.¹⁰³

⁹⁷ NA, EA-1, 80/6/1.

⁹⁸ N Taylor, *The Home Front, Official History of New Zealand in the Second World War*, 1986, v. 1, p. 3.

⁹⁹ Taylor, *The Home Front*, v. 1, p. 481.

¹⁰⁰ NA, EA-1 80/6/1; EA-1, W1784, 80/6/1.

¹⁰¹ NA, EA-1, 80/6/1.

¹⁰² NA, Air-1, 134/6/1; See also Taylor, *The Home Front*, v. 1, p. 481.

¹⁰³ NA, EA-1, 80/6/1, pt. 2.

The RNZAF acquired CW spray tanks for airborne spraying of CW simulants on troops being trained in gasmask discipline. A mixture of water, glycerine and aniseed was used to simulate the CW agent.¹⁰⁴

7 EVOLUTION OF UNITED STATES PACIFIC CW POLICY IN WORLD WAR TWO

Before looking at New Zealand CW activity in World War 2 it is useful to summarise United States activity. Although in the end no gas was used in the Pacific, the US for a while had definite plans to initiate the use of gas against the Japanese. US CW planning in the Pacific campaign can be divided into defensive activities and three overlapping offensive phases as follows:

7.1 Defensive preparations

Initially it was believed that the Japanese were well prepared to wage CW, and, since Japan had not ratified the Geneva Protocol, there was considerable fear that Japan would initiate CW. This apparently did not translate into preparation of effective defences against gas attack on US forces in the Pacific. The NZ Army Medical Corps CW specialist, Captain Antonoff-Lewis, after a tour of US bases in the Pacific, found that their Chemical Warfare Service was 'mostly offensive in function': he recommended that New Zealand follow British and Australian formulae in developing defensive measures for its own forces.¹⁰⁵ The NZ Army CW staff officer, Captain Melville, recommended that New Zealand not rely on the US for CW defensive training.¹⁰⁶

¹⁰⁴ Acquisition of these SC-1 tanks from Britain caused a minor security flap. Britain was apparently reluctant to admit having any CW paraphernalia at all, and after New Zealand's order was placed in the normal way the Air Ministry reprimanded the NZ High Commissioner on 19 February 1937:

I am to add that it is particularly requested that all correspondence relating to the supply of equipment of this nature should be treated as confidential and marked "Secret". As the High Commissioner will doubtless be aware His Majesty's Government in both the United Kingdom and in New Zealand are signatories to the General [sic] Protocol for the prohibition of gas warfare. [NA, AD-11, 4/5.]

¹⁰⁵ NA, AD-1, 284/1/7.

¹⁰⁶ NA, Air-1, 133/8/1.

7.2 Retaliatory phase

The US maintained small stocks of CW in forward locations ready for retaliatory use in the event Japan initiated use. Some gas weaponry was captured by US forces from the Japanese on Guadalcanal¹⁰⁷ and this became the justification for US preparations for retaliatory use in that theatre, although, as expressed in the words of the NZ Deputy Chiefs of Staff, there did 'not appear to be any other or greater evidence that the Japanese propose to use gas in this area'.¹⁰⁸

The most complete expression of the retaliatory policy apparently extant in NZ files is a COMSOPAC message dated 27 January 1944 which included the following:

- d. No retaliation with toxic gas will be made unless authorized by ComSoPac.
- e. No other commander will initiate the use of toxic gas.
- f. All commanders will insure by instruction and training that retaliation will be effective if authorized.
- g. To prevent unauthorized use of toxic chemicals, offensive gas munitions will be kept in ready reserve but not issued to combat units.¹⁰⁹

By January 1943, as fears of Japanese initiation were declining, US capability and readiness for supposedly 'retaliatory' use in the Solomons was increasing. US propaganda claimed in August (about the time the 3(NZ)Div arrived in the Solomons) that Japan was ready to use gas to defend Bougainville. According to a secret memo to the NZ Deputy Chief of Air Staff:

Intelligence reports state that the main Japanese CW depots are at Rabaul and in the Buin area. Since the next probable Allied move is an attack on Bougainville, American staff officers fully expect that gas will be used in its defence.

US forces are particularly well equipped with ground and air CW weapons, and are capable of carrying out immediate retaliation in force.¹¹⁰

¹⁰⁷ According to one report Japanese mustard/Lewisite shells had been captured in New Guinea. NA, Air-1, 133/8/33.

¹⁰⁸ NA, EA-1, W2619, 80/6/1, Meeting of NZ Deputy Chiefs of Staff, 26 May 1943.

¹⁰⁹ NA, WAIL-2/31, 7/3. COMSOPAC = Commander South Pacific. (Based in New Caledonia, exercising command in particular over allied operations in the Solomons.)

The retaliatory phase lasted approximately to the end of the Solomons campaign, in March 1944, by which time it was apparent that the Japanese had little offensive CW capability and lacked the logistic capability to support CW.¹¹¹ As recently as 1991 a stockpile of 109 American 155 mm mustard shells was discovered in the Solomons and removed to Johnston Atoll for destruction.¹¹²

7.3 'Tactical' phase¹¹³

Despite protestations to the contrary it became apparent quite early on that Japan had little defensive CW capability (gas masks etc), and from about November 1942 the US began to investigate the possibility of using CW to attack well-dug-in Japanese garrison forces on Pacific islands which were relatively immune to high explosive (HE) bombardment. Japanese cave and tunnel defences on the Pacific islands were not dissimilar to the old trench warfare conditions of World War I.¹¹⁴ The US was not bound by the Geneva Protocol but did feel bound by a statement President Roosevelt had made that the US would not be the first to use CW. This statement was not as reassuring as it sounded, because the US believed, with good reason, that Japan **had** already used CW - against China. Roosevelt said on 6 June 1942:

I desire to make it unmistakably clear that if Japan persists in this inhuman form of warfare against China or against any other of the United Nations, such action will be regarded as though taken against the United States and retaliation in kind and in full measure will be meted out.¹¹⁵

¹¹⁰ NA, Air-1, 133/8/1.

¹¹¹ Prob 1 p. 310, quoting B E Kleber and D Birdsell, *United States in World War II: The Technical Services, the Chemical Warfare Service: Chemicals in Combat*, Washington 1966.

¹¹² Jim Neilsen, "US Army removes mustard gas from Solomon Islands", *Asia-Pacific Defense Forum*, v. 16, No 2. 1992.

¹¹³ The best description, although still inadequate, of the development of US tactical CW employment doctrine in the Pacific is in K Freeman, 'The unfought chemical war', *Bulletin of the Atomic Scientists*, December 1991, pp. 30-39.

¹¹⁴ Prob 1 p. 103.

¹¹⁵ NA, Air-1 130/21/1, 'MOST SECRET memo from the British Joint Staff to the NZ Joint Staff Mission, Washington DC on "present position regarding gas warfare".'

The joint Australian-US-British CW trials [described in sect. 9.2.] in Queensland (in preparation for possible retaliatory use in the Pacific) had established that mustard was several times as effective under tropical conditions as it had been in Europe in World War 1. Jungle canopies helped to prevent dispersal of gas concentrations.

In November 1943 nearly 3000 US Marines died taking Betio Island on Tarawa Atoll in the Gilberts,¹¹⁶ despite the Japanese having been softened up beforehand with slightly over 1 kg of HE for every square metre of the atoll. The Japanese were so well dug-in that they hardly suffered from this bombardment. Nearly 4700 of them fought to the death, with only 17 being captured. US planners pointed out that gas would have been far more effective against such fortifications, and it was calculated that US casualties would have been far less if mustard had been used instead of HE. According to the Chief of the CWS, Maj. Gen. William N Porter:

There is a high probability that none of the 4,000 trapped enemy troops on an island such as Betio would be fighting men at the end of 48 hours after the mustard attack and that a large proportion ... would be dead or would be critically burned stretcher cases three days after the initial bombardment.... It would appear, therefore, that the use of mustard ... would have accomplished the mission with a gross expenditure of approximately one third of the weight of the munitions used and at the cost of very few casualties to our forces.¹¹⁷

In December 1943 US bombers experimented with mustard gas bombing of Brook Island off the coast of Queensland. In March 1944 the US military held a conference on gas effectiveness in the tropics, and a committee was set up to investigate further. By July it was recommended that bombardment with gas plus HE would be superior to use of HE alone in what was left of the Pacific island-hopping campaign. However there was still reluctance to use gas, on account of the widespread revulsion towards it, and the recommendation was not acted upon. The US was preparing for its assault on Iwo Jima, where the situation was similar to that already encountered at Tarawa. A report drawn up for the American High Command recommended that 'the employment of chemical warfare with complete ruthlessness and upon a vast scale' would have a decisive result against the Japanese holding Iwo Jima.¹¹⁸ Permission was refused by Roosevelt, who

¹¹⁶ ie Kiribati.

¹¹⁷ Freeman 1991, p. 31.

¹¹⁸ H&P, p.135, citing UK Public records Office, WO 193/172. P 398-A. 19 February 1945.

personally loathed the idea of using gas.¹¹⁹ Use was again refused at Okinawa. The tactical phase lasted from late 1942 to late 1944.¹²⁰

7.4 Strategic use

About 1944 the US military was preparing plans for massive strategic chemical bombing of the Japanese homeland prior to US invasion. The bombing was planned for June 1945, and it was envisaged it would take 6 weeks to complete, with 1 139 000 CW bombs being used in the first 4 weeks. The US Joint Chiefs of Staff calculated that about 120 000 tons of CW might be needed in total.¹²¹ It was calculated that the gas, one third phosgene, two thirds mustard, would produce 5 to 10 million Japanese casualties, and bring about surrender within 3 months. The US also had plans to use herbicides against Japanese rice crops.¹²²

Production was initiated, but finding 48 ships to transport the gas bombs to Pacific island airbases turned out to be a near-insuperable bottleneck. Plans were dropped after the successful explosion of the first atomic bomb in New Mexico in July 1945. A shipload of herbicide was reportedly still on its way to the Pacific in August 1945 when the war ended. US stocks of strategic gas in the Pacific peaked in mid-July at the decidedly modest figure of 248 000 bombs.

Other plans being made in 1945 in connection with the proposed invasion of Kyushu envisaged 'retaliation' on a strategic scale against the homeland if Japan initiated CW. This was seen as requiring a stockpile of 23 500 tons of air-delivered CW munitions and 8500 tons of CW mortar and artillery ammunition - about 10-15 000 agent tons in total. This would have sufficed for about 60 days.¹²³

¹¹⁹ Ironically enough, the Japanese had intended to use BW against the Americans at Iwo Jima, but the ship carrying the 100-strong BW team was sunk before it reached Iwo Jima. See P Williams & D Wallace, *Unit 731: The Japanese Army's Secret of Secrets*, Hodder & Stoughton, 1989.

¹²⁰ Freeman, reference previously cited.

¹²¹ Prob 1 p. 305, quoting F J Brown, *Chemical Warfare: A Study in Restraints*, Princeton, 1968.

¹²² Prob 1, p. 328, quoting L P Brophy & G J B Fisher, *US Army in World War 2: The Technical Services: The Chemical Warfare Service: Organizing for War*, Washington DC, 1959.

¹²³ Prob 1, p 305, quoting Brown.

8 NEW ZEALAND CW RESEARCH & PRODUCTION IN WORLD WAR 2

Right from the start of World War 2 the NZ Government believed that technology would be a key to winning it, and that science had to be mobilised as effectively as was manpower. Britain encouraged the Dominions to be as self-sufficient as possible in developing the new technologies of war. In New Zealand Dr (later Sir) Ernest Marsden, head of the DSIR (Department of Scientific & Industrial Research) was appointed scientific adviser to the military in October 1939 and became Director of Scientific Developments (DSD) in June 1940. At the same time a Defence Science Advisory Committee (DSAC) was set up to advise the Chiefs of Staff and coordinate science contributions to the war effort.¹²⁴ Chemical research was prominent in all this. The Defence Science secretariat headed by Marsden included J AD Nash, head chemist in DSIR¹²⁵. Professor F G Soper of Otago University was appointed deputy DSD for chemistry. Soper and another chemist, Dr J C Andrews of Hellaby's meatworks, were appointed to DSAC. DSAC created a Chemical panel which was active, especially up until mid-1942, and directed research on ways of countering CW attacks. Technical representatives from the armed services were appointed to DSAC, including Captain J Melville, senior staff officer (SSO) for CW for all three services.¹²⁶

The history of NZ science efforts in World War 2 is not easy to uncover. Many important wartime research files were destroyed after the war. What follows in the next section is probably a quite incomplete account of New Zealand CW research during World War 2.

8.1 CW research of mostly defensive significance

CW research was quite decentralized. Different scientists in various institutions were assigned responsibility by DSD for studying different gases. Small quantities of all the known World War 1 CW agents were made at various laboratories in the DSIR, the Department of Agriculture and the universities.¹²⁷ These gases were used in 'gas smelling

¹²⁴ J D Atkinson, *DSIR's First Fifty Years*, DSIR Information Series 115, 1976, ch. 4, 'Wartime activities of DSIR'.

¹²⁵ son of Walter Nash, wartime cabinet minister, later prime minister.

¹²⁶ August 1941, NA, AAOQ, W3424, Bx. 16, Nar. 2.

¹²⁷ NA, SIR-1, 1/1/19.

sets' for teaching troops and EPS personnel gas recognition.¹²⁸ and for adding realism to gas mask training.

In Christchurch Dr Annett of the DSIR designed a gasmask of locally made materials. A quarter million were eventually manufactured. DSIR was particularly involved in perfecting the activated charcoal and the various absorbent chemicals in the gas mask canister. R Robinson of Auckland University did much of the absorption research.¹²⁹

8.2 CW research with offensive potential

Preparations for possible use of gas began early in the war. In early 1942 when Japanese invasion was expected the Northern Military District was given virtual autonomy in preparing to meet this threat¹³⁰. This included seeking ideas on local weapons production from the local DSAC people, along with such ideas as molotov cocktails filled with local gasworks by-products, and nitrocellulose explosives made from old movie film. Dr Andrews of the DSAC Auckland sub-committee reported in March 1942 that 'it was possible to produce all types of poison gas but not in sufficient quantities to enable their use for large scale offensive action'.¹³¹ Another report said that "some development" had been carried out in the production of gas. Prussic acid and stannic chloride¹³² for the asphyxiation of tank crews was discussed. Brigadier Bell [commander of the Northern Military district) stated he wanted anything of this type that was available, but he could not authorize its production.¹³³

After the threat of immediate invasion receded New Zealand settled down to assisting its allies in cooperative CW development. DSAC resolved in June 1942 to arrange 'fullest

¹²⁸ NA EA-1 W1784, 80/6/1, "Summary of Chemical Warfare activities 12/1/43".

¹²⁹ P W Burbidge New Zealand Science in World War 2, MS in Turnbull Library as Acc. 81-207 and in NA as WAI-21, fldr. 79.

¹³⁰ Burbidge MS, NA, WAI-21, 79B, p 141.

¹³¹ DSAC Auckland sub-committee meeting 17 March 1942, NA, N-2, 22/4/40.

¹³² a First World war CW agent - see 'White Star' in sect. 5.2.

¹³³ DSAC Auckland sub-committee 11 March 1942, NA, N-2, 22/4/40.

cooperation' in CW with the US Army.¹³⁴ A British CW mission visiting in July 1942 was impressed by the 'high degree of cooperation and coordination between the Services and Technical departments' in covering the 'technical and production aspects' of CW under Dr Marsden.¹³⁵ A further British CW mission visited in mid 1943.¹³⁶

Later in the war, New Zealand was involved in assisting the UK in exploring the effects of two new British mustard gases. At Otago Medical School a Mr Crawford under Professor Smirk's lead was testing the physiological effects of a gas called 'S'¹³⁷ on live rabbits. At one stage it was suggested that Crawford should go to Australia to demonstrate NZ progress in studying this gas.¹³⁸ The other gas was called T773, and was worked on by L H Briggs at Auckland University. He developed an indicator dye for detecting its presence.¹³⁹ This gas cannot be conclusively identified.¹⁴⁰ In mid 1943 it was reported that

Further work has been done in England and New Zealand on the nitrogen vesicants 'S' and T773 but latest reports from England state that the high pressure work on these gases has now ceased. It is known that the Germans have T773. The advantage of these vesicants is that they have very little smell.¹⁴¹

In August 1943 Dr Andrews reported on talks with the British CW liaison officer in Washington DC., a Mr Kingan, from whom 'he learned that development on gases was

¹³⁴ NA, N-2, 22/4/40.

¹³⁵ NA, EA-1, W1784, 80/6/1.

¹³⁶ NA, N-2, 22/4/40.

¹³⁷ "S", was a so-called nitrogen mustard, Methyl-bis-(2-chloroethyl)amine, described in Prob 1, pp. 78, 86-7, 272. According to L P Hartley [pers com] "S" was the only one of the nitrogen mustards seriously considered for use by Britain. It was regarded as holding out some promise of providing a more volatile agent than mustard which would have equally severe effects on exposed skin. Production was abandoned after a quantity of "S" exploded spontaneously in storage.

¹³⁸ DSAC meeting, 21 May 1943, NA, N-2, 22/4/40; Burbidge MS.

¹³⁹ Burbidge MS. Turnbull Library 81-207.

¹⁴⁰ It was described as a nitrogen mustard in New Zealand but is more likely to have been one of the higher homologues of sulphur mustard, which in Britain was codenamed 'T'. Some of these were reported by their British developers to be five times as effective as ordinary mustard. Substantial quantities of T were manufactured by Britain during World War 2. [Prob 1, pp. 79-80.]. L P Hartley [pers com] thinks T773 was probably the tri(2, chloroethyl) amine derived from HCl and triethanolamine, even more prone to spontaneous explosion than 'S'.

¹⁴¹ Report on 'Chemical Warfare position' prepared from 'C.W. intelligence reports' for the 21 May meeting of DSAC, NA, N-2, 22/4/40.

likely to be in the development of toxic smokes rather than poison gases. Mr Kingan had stated that in his opinion there was no necessity for any further work on 'S' or T773'.

The fact that these gases were both British would seem to indicate that this research was concerned with the offence more than the defence.¹⁴² In February 1944 Captain Melville advised that there was no further requirements in New Zealand by Army for CW materials.¹⁴³

Cooperation with the US forces is harder to document. There was certainly cooperation with a US Army Chemical Warfare Service Unit based in Auckland in the latter stages of the war. This is documented in a file about the joint development, testing and production of an improved form of napalm by an Auckland firm and CWS personnel in 1943.¹⁴⁴

8.3 Offensive CW production

New Zealand had an amazingly large munitions industry, started from scratch during World War 2. Fuse manufacture for munitions produced elsewhere in the 'southern' Commonwealth (India, Australia and South Africa) was a NZ specialty. According to a Department of Industries & Commerce summary of wartime military production New Zealand produced 50 000 chemical land mines for US forces in the Pacific area. Presumably only the casings and fuses were made in New Zealand, with the filling being done elsewhere. No further details are known.¹⁴⁵ These were probably the one gallon land mine, which was generally filled in the field, with 'HD' mustard.¹⁴⁶

¹⁴² Curiously, however a very detailed US intelligence bulletin on HN-2 (the American codename for what the British called S. See Prob 1 p. 78) was distributed to Pacific allies in August 1942. HN-2 was described as having been produced by the US in experimental quantities and by the Axis in operational quantities.[NA WAI-2/31, 7/3] In fact neither Germany or Japan made HN-2. [Prob 1, p. 78.]

¹⁴³ NA, N-2, 22/4/40.

¹⁴⁴ Gasolene [sic] thickener project NA, IC-66, W2618, 169/1. Although incendiary weapons are the responsibility of the CWS in the US forces, they are not encompassed by the definition of CW employed in this paper. See O Wilkes, Development & production of incendiary war material in New Zealand during World War 2, [unpublished] November 1992.

¹⁴⁵ Annual report, AJHR, 1946, H44, p. 35. Files of the Ministry of Supply and the Munitions Control Board were mostly destroyed at the end of the world, so it is unlikely that more will become known.

¹⁴⁶ Prob-2, pp. 82-83.

New Zealand sent 30 chemists to Maribyrnong munitions factory in Melbourne in July 1941 at Australia's request to assist with munitions development and production.¹⁴⁷ 'The matter' was 'one of extreme urgency' according to the director of the NZ National Service Department, and the chemists mostly remained in Australia for the duration of the war. At least one of these chemists, W F Chappel, was involved in 'chemical defence', while another, L H Bird, was on a 'special munitions project'.¹⁴⁸

8.4 Gas trials in Australia

8.4.1 The trials

Only in the last few years has it been gradually revealed that a very comprehensive series of tests of CW agents, defences and techniques was carried out in Australia during World War 2. In World War 1 CW had been mostly used in cool temperate climates. Between the wars very little experience had been accumulated in CW at all, and tropical CW was still very much an unknown quantity when World War 2 began. The US began tropical CW testing at sites in Florida and Panama, and Britain did some testing in India, but Australia was by far the preferred location for both countries. Australians were told by the British that it was their 'imperial responsibility' to volunteer for the tests. The Australians were 'keen as mustard' and volunteered in their thousands.¹⁴⁹

Initial testing was largely defensive in intent and involved exploring the physiological effects, in particular of mustard. Soldiers were exposed to controlled doses of mustard, then made to perform repetitive physical tasks like digging ditches in the sun until they collapsed. The length of ditch dug gave a measure of physical impairment from the gas. On average volunteers ended up in hospital for a month; one was hospitalized for 14 months. It was discovered that mustard was four times as effective in the tropics as it had been in World War 1 trenches, attacking the skin wherever it was moist.¹⁵⁰

¹⁴⁷ NA, AD-1, 271/20/3.

¹⁴⁸ NA, AAOQ, W4076, 55/11/2.

¹⁴⁹ This and the following paragraphs are largely based on Freeman 1991 [note 114].

¹⁵⁰ The first report on the Australian CW investigations arrived in New Zealand in February 1943. It described physiological investigations carried out at Townsville, Queensland under Lt Col Freddie Gorrill of the British Army by the RAAF, RAN, US Army and US Marine Corps using Australian volunteers. They found mustard to be about four times as effective under

Having discovered how effective mustard could be, the next step was to explore its employment. The allies began 'developing modifications of weapons of United Kingdom origin'¹⁵¹ in particular for the 25 pounder BE mustard artillery shell which was the mainstay of the British CW arsenal. It was found that in tropical conditions the bursting shells atomized the mustard too finely, so that it tended to disperse too rapidly. To counter this more viscous formulations were developed.

The final phase of testing was undertaken on behalf of the US. This was after the assault on Tarawa, when the US began to seriously consider tactical employment of gas. US B-24 Liberator bombers dropped mustard bombs on Brook Island, off the Queensland Coast, while hundreds of Australian soldiers, waited below, some with and some without protective equipment. The Aussies were considered ideal guinea pigs because, unlike Americans, they exhibited the same sort of ferocious tenacity as were thought to characterise the Japanese. Some of them are still suffering lung and heart problems.

8.4.2 New Zealand participation

The NZ ONS recommended to the PM in June 1942 that in view of the imminent possibility of NZ troops being employed in tropical regions New Zealand should consider contributing scientists to the Australian trials.¹⁵² Australia was understood to be establishing a chemical warfare experimental station (CWES) at Innisfail in Queensland. Dr Marsden favoured NZ participation¹⁵³ and the DSIR proposed that a chemist be appointed to the CWES team and that NZ military personnel should visit from time to time.

In October the NZ Acting PM wrote to the Australian PM that New Zealand would like 'to associate suitable personnel from New Zealand with the [proposed] Station', in readiness

tropical conditions it was used under temperate conditions. They found that scrotal burns were the chief cause of disability, and they experimented with 'impregnated underpants' prepared by 'the bucket method of impregnation', as described in Porton Report No 2374. It was found possible to produce garments in which the impregnation would stand up to one week's wear under tropical conditions. [NA, Air-1, 133/8/3.]

¹⁵¹ NA, N-1, 16/30/32.

¹⁵² NA, Air-1, 134/6/2.

¹⁵³ EA-1, W1784, 80/6/1.

for possible NZ operations in the South Pacific. The Australian PM replied on 10 October that there were no firm plans as yet to establish the station.¹⁵⁴

By the end of the year the plans were firm and it was suggested that New Zealand 'might possibly be able and desirous of affording assistance by making scientists available for the station'. Later, on 22 December, the Australian PM sent a secret telegram to the NZ PM asking New Zealand to appoint a representative to the Experimental and Research subcommittee based at Maribyrnong.¹⁵⁵ Foss Shanahan, ONS secretary suggested to the NZ CoS that since the invitation involved munitions research perhaps a military representative as well as DSIR people should go.¹⁵⁶ Captain Melville, the NZ Army's CW staff officer, prepared a memo for the PM offering to investigate the possibility while he was on a staff chemical course in Australia in March. This was approved.¹⁵⁷

With the effectiveness of mustard in the tropics proven, the main problem to be dealt with was modification of British CW weapons for tropical use.¹⁵⁸ New Zealand was concerned that its British-supplied 'BE' mustard gas shells for 25-pounder artillery did not explode properly under tropical conditions. The recently developed 'base ejection' or BE shell was designed to embed itself nose down in the ground, after which a burster charge would eject the mustard gas from the base of the shell.¹⁵⁹ This design was intended to prevent wastage of CW agent from soakage into the ground. This worked fine under temperate conditions but at tropic temperatures the agent was too finely atomized by the burster charge, leading to over-rapid dispersal and dilution. By June 1943 work on improving the BE shells was under way in Australia. Captain Melville reported after his fact finding trip to Australia that Australia was making progress on correcting 'the disappointing results given by BE Chemical Shell in the tropics'.

¹⁵⁴ NA, EA-1, W1784, 80/6/1.

¹⁵⁵ NA, N-1, 16/30/32.

¹⁵⁶ NA, Air-1, 134/6/2.

¹⁵⁷ NA, EA-1, W1784, 80/6/1.

¹⁵⁸ NA, N-1, 16/30/32.

¹⁵⁹ Prob 1, p. 106.

In view of the fact that 3(NZ)Div has been equipped with 25-pdr BE Chemical Shell and that this is the only ground chemical weapon available to them, New Zealand is vitally concerned'.¹⁶⁰

According to the same report:

.... England has also agreed to release chemists to tackle the problem of BE Chemical Shell. She is also supplying 25-pdr BE Shell with specially thickened filling for trial in Queensland. If this is successful Australia will endeavour to empty and recharge the large stocks of 25-pdr shell which she holds.

Arrangements are well advanced for the purchase of a large area of land in Queensland where trials of air and ground CW weapons can be carried out.¹⁶¹

Melville recommended that New Zealand send both scientific and military participants to the Innisfail tests for the investigation of 25-pdr problems.¹⁶² His recommendations were considered at a meeting on 2 July of the NZ Deputy CoS also attended by Marsden and Soper. The Deputy Chiefs decided to send Captain Antonoff-Lewis as a military representative, but were reluctant to get too involved in the Innisfail tests, on the grounds that gas was now unlikely to be used given the improved nature of the strategic situation in the South Pacific. It had already been decided that J A D Nash would go to Melbourne as scientific liaison, and it was now decided that he could handle liaison with Innisfail as well. Nash departed for Australia in January 1944.¹⁶³

9 NEW ZEALAND CW POLICIES IN WORLD WAR 2

A reasonably thorough search of NZ World War 2 archives has failed to turn up any material relating to NZ involvement with CW in the North African or European theatres. Presumably New Zealand forces would have had access to CW arsenals maintained in these theatres by the allies if higher commands had decided to initiate CW use.

¹⁶⁰ NA, Air-1, 134/6/2.

¹⁶¹ NA, N-1, 16/30/22.

¹⁶² NA, N-1, 16/30/22; Air-1, 134/6/2.

¹⁶³ NA, EA-1, W2619, 80/6/1.

At home however New Zealand made extensive preparations against gas attack and prepared policies for use of CW in the Pacific. The evolution of NZ CW policy in the Pacific, and the munitions to support it, can be considered under the same headings as US policy was in section 7.

9.1 Defensive policy

9.1.1 Anti-gas defence on the home front

Serious preparations for the defence of New Zealand began in late 1939 soon after the outbreak of the war. Preparations to protect civilian population from gas attack were included in the responsibilities of the Emergency Precautions Service (EPS) set up in mid-1941. In Auckland both stationary and mobile testing stations were established for the identification of war gases, and 1500 military gas masks were initially assigned to EPS personnel.¹⁶⁴ A quarter of a million of the DSIR-designed gas masks [sect. 8.1] were eventually manufactured in Christchurch by the Latex Rubber Co. Eyepieces for these masks were made from used hospital X-ray film, with supplies from as far away as the Auckland Hospital Board being sought for the purpose.¹⁶⁵ Activated charcoal for the gasmask filters was made from coconut shell at the Devonport gasworks.¹⁶⁶ Rigid testing reportedly showed that these gasmasks were twice as rugged as those Britain was supplying to its civilian population, but complaints about them were numerous.¹⁶⁷

Gas attack on New Zealand was judged in April 1942 to be less likely¹⁶⁸ and in September to be unlikely, but if it did happen 'its first use would probably be against aerodromes and seaports'.¹⁶⁹ Chloride of lime was stockpiled throughout New Zealand

¹⁶⁴ NA, IA-1, 178/3/1.

¹⁶⁵ NA, IA-1, 178/3/1.

¹⁶⁶ NA, SIR-1, 1/1/9.

¹⁶⁷ NA, IA-1, 178/3/3.

¹⁶⁸ NA, EA-1, W1784, 80/6/1.

¹⁶⁹ NA, 133/8/1, September 1942.

for decontamination purposes, especially at airports.¹⁷⁰ The War Cabinet approved a pamphlet for householders on anti-gas precautions in October but publication was blocked by the National Service Department to conserve paper.¹⁷¹

Preparedness for gas attack against New Zealand possibly peaked about May 1943, by which time 190 000 gasmasks had been distributed to the EPS, particularly to port towns - Westport and Greymouth, for example, had been allocated 1000 each. Auckland got 60 000.¹⁷² Decontamination squads had been organized in 18 'vulnerable gas areas' - mostly ports. Radar stations were seen as specially vulnerable.¹⁷³ The Chiefs of Staff agreed in July that 'the possibility of the use of gas against New Zealand is so remote as to be almost negligible'.¹⁷⁴

9.1.2 Defensive military preparations

In March 1941 the War Cabinet decided to acquire gas masks for all members of the armed forces at a cost of 35 677 pounds, 'even though the probability of gas attack is very remote'. The logic behind the purchase was that 'if an enemy knew that respirators were not part of the equipment of the Army he would be more inclined ... to use gas.' All New Zealand forces in the Pacific - on Fiji, Tonga, and Fanning Island - were to be equipped.¹⁷⁵ In May the US CINCPAC advised New Zealand that its units in Fiji should be prepared for gas attack, presumably from Japan.¹⁷⁶ Immediately after the Pearl Harbour attack the ONS asked the General Assembly Library if Japan had ratified the Geneva Convention. The Library replied, after searching the London Times index amongst other sources, that it appeared Japan had not.¹⁷⁷

¹⁷⁰ There was, for example, 5 tons on hand at Rongotai (Wellington), 2576 lb at Ohakea, and 7 lb at the Haast Public Works Camp (South Westland) as of 19 June 1942.[NA, Air-1, 133/8/11.]

¹⁷¹ NA, EA-1, W1784, 80/6/1.

¹⁷² NA, Air-1, 134/6/1.

¹⁷³ NA, AD-11, 4/7.

¹⁷⁴ NA, Air-1, 133/8/1.

¹⁷⁵ NA, Air-1, 133/8/1.

¹⁷⁶ NA, Air-1, 133/8/1; EA-1, W1784, 80/6/1.

¹⁷⁷ NA, EA-1, W1784, 80/6/1. Japan did not ratify until 1970.

In May 1942 a secret cable from the US COMSOPAC in New Caledonia warned: 'The fact that the Japs have not used gas against U.S. forces is NOT to be taken as a criterion that gas will NOT be used in future...'¹⁷⁸ All New Zealanders in Fiji were equipped with masks and gas capes by July. Gas drill - wearing masks one hour a week - was initiated. By January 1943 the threat was regarded as having 'considerably diminished' and protective equipment was being shipped from the islands back to New Zealand.¹⁷⁹ In May it was announced that NZ troops in New Caledonia did not need anti-gas gear.¹⁸⁰

Concern about gas attack increased again in late 1943, presumably because of awareness of US plans to use gas against the Japanese. The NZ Medical Corps established a subsection to deal with the medical aspects of CW and sent Captain L S Antonoff-Lewis on a tour of allied military bases in the South Pacific in December 1943 to investigate the medical aspects of tropical CW. He recommended that New Zealand follow the British and Australian formula 'whereby offence is a function of the Air Forces and such special troops as may be employed, and defence is in general a function of the Medical Corps'. He recommended that the NZ Medical Corps should send instructors to the Innisfail Station in Queensland 'which conducts research into both the offensive and defensive aspects of C.W.' and that the knowledge so gained should be passed on to the NZ Third Division (3(NZ)Div).¹⁸¹ The same month 3(NZ)Div arrived in New Caledonia to prepare for the Solomons campaign. 'Selected officers and men were despatched far and wide to gather the latest information on jungle fighting and amphibious warfare. Some went to ... chemical warfare schools in Australia.'¹⁸²

¹⁷⁸ NA, WAI-2/31, 7/3.

¹⁷⁹ Air-1, 133/8/1.

¹⁸⁰ NA, EA-1, W2619, 80/6/1, pt. 2.

¹⁸¹ NA, AD-1, 284/1/7.

¹⁸² Official history of New Zealand in the Second World war: O A Gillespie, *The Pacific*, 1952, p. 87.

9.2 Retaliatory policy

In October 1942 NZ Army Operation Instruction no 28, Secret, reaffirmed that:

New Zealand will under NO circumstances initiate gas warfare against the enemy....

In the event of gas being used by the enemy it is the intention to retaliate with gas shell attack of sufficient weight to harass him and burden him with anti-gas equipment.¹⁸³

After the Japanese were reported to have used tear gas and cyanide against the Singapore base¹⁸⁴ two CW staff officers were appointed at Army HQ and a chemical warfare wing was established at the Army School Trentham. Duties of the staff included studying offensive use of gas and being 'prepared to teach offensive use of gas'. The General staff in July asked the DSIR Animal Research Station at nearby Wallaceville to supply animals for use in experiments on the effects of various war gases on eyes and skin.¹⁸⁵

It seems these preparations were concerned with the Pacific war against Japan rather than the European war against Germany. The NZ forces in Fiji were being withdrawn and reconstituted and augmented as (3(NZ)Div). This Division was then trained for the US-led campaign to re-take the Solomons.

Later that year, with the 3(NZ)Div about to depart for the Pacific, where it would be under US command, retaliatory policy was re-defined in a US context. New Zealand was aware of Roosevelt's position on retaliation. On 13 November 1942 the NZ Minister in Washington, Walter Nash, sent a 'Most Secret and Personal' cable to his Prime Minister in Wellington which included:

Following is paraphrase of memorandum from British Chiefs of Staff....

2 Circumstances in which gas warfare might break out covered by statement made by Prime Minister United Kingdom re use by Germans of

¹⁸³ NA, Air-1, 133/8/1.

¹⁸⁴ NA, WAIL-2/31, 7/3.

¹⁸⁵ NA, AD-1, 209/3/48.

- gas against Russia on 10 May 1942 and President USA re use of gas by Japanese against China on 6 June 1942¹⁸⁶ which please examine.
- 3 British Chiefs of Staff view that position is adequately covered by these statements....
 - 4 Detailed procedure....
 - (d) If reports confirmed that gas has been used on British Commander in Chief will ask War Cabinet for permission to retaliate....

In a further cable on 16 November to the NZ Chiefs of Staff Nash continued:

Combined Chiefs of Staff have approved (subject to US UK Government approval) that

- (a) Gas warfare will be undertaken by both US and British Commonwealth Forces on order of the Combined Chiefs of Staff after approval by appropriate Governmental authorities or independently by any such Nation in retaliation.
- (b) US and British Commonwealth Forces will provide evidence of enemy's use of gas....
- (c) When decision to retaliate made independently by any Nation it will give immediately confirmed advice to Combined Chiefs of Staff.¹⁸⁷

The NZ Chiefs of Staff, meeting in January 1943, noted the US-UK procedures for retaliation and

It was decided that similar arrangements will apply in New Zealand, namely:

- (a) that there will first be confirmation of the fact that gas has been employed;
- (b) that a report will be submitted to War Cabinet by the Chiefs of Staff outlining the circumstances and submitting a recommendation as to the action which will be taken;
- (c) that War Cabinet will then decide, very possibly after reference to the United Kingdom Government, as to whether or not gas will be employed in retaliation.¹⁸⁸

¹⁸⁶ See sect. 7.3 and footnote 116.

¹⁸⁷ NA, EA-1, W1784, 80/6/1, Message 716. The MOST SECRET British Joint Staff memo to the NZ Joint Staff Mission, Washington, on which this message is based is preserved in NA, Air-1, 130/21/1.

¹⁸⁸ Secret schedule No 4 of the Minutes of the 108th Meeting of the Chiefs of Staff Committee, Wellington 21/1/43. NA, EA-1, W1784, 80/6/1.

A few days later the NZ Deputy Chief of Air Staff suggested that this procedure needed to be amended to cover the situation in the South Pacific:

.... For instance, if the Japanese used gas against American forces in Guadalcanal, the United States Commander might, after obtaining the requisite authority from Washington, order retaliation. As New Zealand air units are operating from both Esperitu Santos [sic] and Guadalcanal under U.S. Command, these units might be required to take offensive action with gas-filled bombs.

If however, the procedure, as defined in the CoS minutes is followed, the New Zealand Unit Commanders are entitled to request that authority be obtained from the War Cabinet in New Zealand before carrying out their instructions. If reference is made to the United Kingdom before granting such authority, there may be delay of many days, possibly weeks, before the Unit Commanders are apprised of the decision.

It is suggested that an additional clause be added to the decisions already made, viz:-

'(d) that should the United States decide to take retaliatory action in any theatre in which New Zealand forces are operating under United States Command, the New Zealand Commanders will comply with any instructions given and inform the New Zealand Chiefs of Staff at the earliest opportunity of the action taken.'¹⁸⁹

The way was thus clear for retaliatory use of CW by New Zealand forces in the Pacific. New Zealand had substantial stocks of artillery CW during the war, but it seems that aerial bombing was being considered for retaliatory purposes. In June 1943 Captain Melville reported after his three months in Australia that:

Large stocks of offensive equipment and chemical armaments were held and a considerable body of personnel were being trained in their use. The view was now held that the offensive use of chemical agents was primarily a matter for the Air Force.

An RNZAF officer responded that:

Retaliation [by NZ would require] suitable tie-ups with American and/or Australian forces.¹⁹⁰

¹⁸⁹ MEMORANDUM for: The Secretary, Organization for National Security, January 28, 1943. NA, EA-1 W1784, 80/6/1.

¹⁹⁰ NA, Air-1, 133/8/1.

The US had been ready to supply RNZAF units in the New Hebrides and Guadalcanal with mustard bombs back in January 1943. There had been some problem about RNZAF bomb racks not taking US bombs, and HQ USAFISPAC ¹⁹¹ recommended that if this problem were insuperable the RNZAF should be supplied with British bombs and spray tanks.¹⁹² By July 1943 this problem had apparently been overcome and 'RNZAF squadrons in the South Pacific [were] supplied with American gas equipment which differs in many respects from British'.¹⁹³

By August the US forces with whom New Zealand was fighting in the Solomons were 'particularly well equipped with ground and air CW weapons [and] capable of carrying out immediate retaliation in force'¹⁹⁴ The US 155 mm mustard shells recovered from the Solomons in 1991 [sect. 7.2 above] would have been useable in 3(NZ)Div heavy artillery. Whether the 3(NZ)Div had its own CW ammunition with it in the Solomons is not clear. Captain Melville, as earlier quoted [sect 8.4.2], wrote that '3(NZ)Div has been equipped with 25-pdr BE shell', but this was 2 months before the Division left New Caledonia for the Solomons, and he may have been referring to the CW munitions held in New Zealand for possible Pacific use [sect 10]. A month later the 3(NZ)Div CW equipment was described as being all-British 'but in the event of large scale chemical warfare operations in the South Pacific it is probable that they would require to use United States supplies at some stage'.¹⁹⁵

9.3. Tactical phase - NZ approaches decision on first use

Through most of 1943 New Zealand was aware that Japanese CW attack was unlikely and that the US had considerable amounts of offensive CW munitions in the Pacific but very little defensive gear, but there seems to have been no inkling that the US might be planning to initiate tactical CW.

This realization may have first come in January 1944, after the decision not to have full-time NZ representation at the Innisfail CW tests. [Section 8.5 above] That decision was

¹⁹¹ ie US Armed Forces in South Pacific.

¹⁹² NA, Air-1, 133/8/1.

¹⁹³ NA, Air-1, 134/6/2.

¹⁹⁴ NA, Air-1, 133/8/1.

¹⁹⁵ NA, Air-1, 134/6/2.

disputed by the NZ liaison officer in Melbourne, Capt Tom Wilkes. He thought that having Nash attempt to maintain liaison with the Innisfail tests while based in Melbourne was quite inadequate given that Innisfail was two day's air travel from Melbourne and the tests needed fulltime, continuous participation. Wilkes discussed the matter with his old friend the deputy Chief of Air Staff, Air Vice Marshall Arthur Nevill.¹⁹⁶ He then wrote a 'secret and personal' letter to the Chief of Air Staff, Air Vice Marshall L M Isitt, asserting that improvement in the strategic situation did not necessarily mean that

the Jap will not use C.W. against our troops.... moreover it must be remembered that neither the Americans nor the Japanese have ever signed anything to say they will not use C.W. methods in the conduct of any war.

I verbally informed Nevill on another aspect which must, for the time being at any rate, be kept off paper.¹⁹⁷

Reading between the lines and taking account of the context suggests that what had to be 'kept off paper' was information about US plans for possible first use of CW.

Wilkes' superiors in Wellington responded with a 'Most secret and personal' message to Wilkes which is difficult to interpret but which seems to say that while the possibility of the USA using gas in the Pacific 'cannot entirely be excluded', the fact that the 3(NZ)Div is under US command means that

there is no question but that the G.O.C. would receive early intimation of any American intention in this connection. The view held by the Army here is that whatever experiments US personnel may be carrying out in the South Pacific zone on chemical warfare, approval on the highest level would have to be given and warning would be received. They still feel it would not be initiated by the United States.¹⁹⁸

Presumably the experiments referred to were the US mustard bombing trials on Brook Island in Australia the previous August - there is no evidence in the files of New Zealand having been informed any earlier about them.

¹⁹⁶ Later Sir Arthur, director of Civil Aviation 1956-64.

¹⁹⁷ NA, Air-1, 134/6/2.

¹⁹⁸ 14 February 1942. NA, Air-1, 134/6/2.

By July 1944 Flt. Lt. R E Jack¹⁹⁹, RNZAF Gas Officer, and the only gas expert left in NZ,²⁰⁰ had apparently been made aware of the US plans for tactical CW. He wrote a 10 page single-spaced well-documented, tightly argued report which proposed tactical CW use against in Japan along lines very similar to those being suggested within the US military. He summarised the various CW agents and munitions available and the various defensive and prophylactic measures to counteract them. He pointed out that the quantity of CW agent available to Britain alone was greater than was available to all belligerents in World War 1, and that US supplies were probably even greater. The quantities that could be disseminated using aircraft were vastly greater than could be disseminated by projectiles and cylinders in World War 1. Most importantly, he said, CW agents tended to be much more effective under tropical conditions, while defences such as masks, oilskin gas capes and ointments were less effective and in some cases unusable in tropical conditions.

He predicted that gas warfare was becoming less likely in Europe and more likely in the Pacific. It seems, he wrote, 'that we have had, and still have, 'our pants down' so far as gas defence in the tropics is concerned', and that the allies' principal defence against CW at present was the fighter aircraft. He quoted information received from Melbourne the previous month as indicating

that a determined effort is being made to complete the basic work on defensive AND OFFENSIVE gas-warfare problems in the tropics before the end of 1944.[capitalisation is in original]

Tropical CW research in Australia was 'probably by far the most advanced in the world'.

He argued against the alleged 'inhumaneness' of CW.

The view that gas warfare is unduly inhumane ... is ... entirely unsubstantiable. On the other hand it can be strongly argued that gas is the most humane weapon yet devised, and this on the solid grounds:

- (i) Of gas casualties a smaller proportion are fatal than in the case of missile or H.E. casualties.
- (ii) Of non-fatal casualties a much smaller proportion suffer permanent after-effects, contrary to popular delusion on the point.

¹⁹⁹ later Sir Roy Jack, speaker of the House of Parliament.

²⁰⁰ Melville had gone to Australia as part of an Operational Research Unit working on CW and flamethrowers in Northern Australia and New Guinea. [NA, SIR-2, 14.]

- (iii) While choking gases admittedly produce highly distressing results on serious casualties, the amount of pain inflicted by and large by gas is far smaller than is the case with missile or H.E. wounds....

In the Pacific, he argued, the likelihood of gas being used was increasing:

Prospects in the Pacific

Because of the greatly increased effectiveness of chemical agents in the tropics, a heavy advantage will accrue to the side that has air superiority and the best defensive equipment. Indications now are that we shall, within a few months when the latest impregnation facilities become available, have established such a lead over the Japanese that to refrain from using gas [against Japan] would be merely to throw away the lives of our own people.

Tarawa and Brook Island Tests

Thus at Tarawa H.E. shells and bombs were delivered to the astronomic figure of over 2.2 pounds per SQUARE YARD of the attol [sic]; yet the Japs were not dislodged and the Americans suffered very heavily in landing. But the vapour from less than ONE HUNDREDTH of this weight of mustard might have been expected to produce 100% casualties within 72 hours among defenders protected only with respirators; and mustard of a far smaller weight ... would have broken down any known form of protection other than gas-proof air-conditioned shelters. The above observations follow large scale mustard bombing tests on Brook Island off the coast of Queensland which have been carried out since the attack on Tarawa was made.

Who will use gas first?

When upon the collapse of Germany, the British public, like the American, is safely removed from possible contact with gas, the existing uninformed popular and political prejudice against its use is likely to decrease. By that time our own gas defences should be in a satisfactory condition, and there are indications that it may not even be left to the enemy to take the advantage of launching the first gas attack. (The United States has at no time agreed to 'outlaw' gas, and so even the legal objection, for what it is worth, to the use of gas does not apply.) On the other hand a statement appeared in a recently-captured Japanese document to the effect that the Americans did not regard gas as an inhumane weapon and might use it if they thought it would benefit them. The possibility cannot be overlooked that if the Japs think gas is likely to be used they will invoke their flair for surprise and 'get in first'. The first large-scale attack, whoever makes it, is certain to be highly successful.

A Wing Commander Sawyer minuted that Jack's report revealed 'some very disquieting features' and that 'it does seem that the whole question of C.W. needs serious study here and the present organization revised'. Someone annotated the minute 'An excellent report by F/L Jack'. What effect it had is not evident from the files but it apparently impressed Jack's superiors such that they sent Captain Antonoff-Lewis around the Pacific on a third

trip to 'indoctrinate' medical officers in CW techniques. A month later an RNZAF document noted that 'it is understood that we follow US policy completely in the Pacific'.²⁰¹

For the Army with its 25-pdr BE shell the matter was academic. Plans had been made in March to withdraw 3(NZ)Div, and withdrawal was essentially complete by August 1944. All the 3(NZ)Div ammunition²⁰² and stores -- about 10 000 tons, and presumably including any CW shell -- was brought back to New Zealand in October and stored in the Auckland area.²⁰³

RNZAF units, on the other hand, remained in the Pacific until October 1945 and could well have been involved in US tactical CW if any had been implemented in the Pacific.

Flt Lt Jack kept up his interest in CW, and attended a 2 week gas course at an American officers gas school on Esperitu Santo in February 1945, at which he personally got to fire a round of gas from a 4.2 inch mortar. In March US authorities declared the North Solomons to be 'gas safe' and plans were made to withdraw RAAF protective equipment. Jack disagreed, and the protective gear stayed.²⁰⁴

Whatever the situation may have been with the RNZAF, Australia apparently had prepared plans for tactical CW use by June 1945. NZ received a secret RAAF policy paper on offensive CW which described RAAF heavy bomber squadrons as having M47A2 bombs filled with persistent agent²⁰⁵ and M48 bombs filled with non-persistent agent.²⁰⁶ RAAF GR/B and Attack squadrons had 250-pound LC bombs and SCI tanks.²⁰⁷ It noted further:

²⁰¹ NA, Air-1, 133/8/1.

²⁰² NA, AD-1, 375/3/1.

²⁰³ Gillespie, p. 201. Possibly it went into storage vacated by the Americans at Mangere Crossing. [NA, AD-1, 375/3/1.]

²⁰⁴ NA, AIR-1, 133/8/1.

²⁰⁵ A euphemism for mustard.

²⁰⁶ A euphemism for cyanide-type blood poisons.

²⁰⁷ "primarily for smoke laying but can also be used for gas spraying". These were the same variety of British spray tank as New Zealand had procured in 1939 for training purposes. As R E Jack noted in his report these would be useless in jungle covered territory "since the foliage forms an effective umbrella".

No specialised training is necessary to enable aircrews to execute gas bombing missions.

CW is to be confined to Japanese military installations except by specific direction from higher authority. Consistent with the demands of military necessity every effort should be made to safeguard friendly civilian populations.

Scale of effort: Initial attack for maximum of 15 days with 75% gas and 25% H.E. Subsequent effort is to exploit tactical advantages of chemicals using 25% gas and 75% H.E.²⁰⁸

9.4 Strategic phase

There is no evidence for NZ being in any way involved in the US preparations for CW attack on Japan.

F/L Jack had the last word on New Zealand CW policy in World War 2. On 21 August, 6 days after Japan's surrender, he closed the Air Force's file Aerodrome defence: Anti-gas precautions: Policy with the annotation 'Hirohito seems rather to have settled this matter for us. FILE'.²⁰⁹

10 NEW ZEALAND'S CHEMICAL WEAPONS STOCKPILE IN WORLD WAR 2

Quite apart from whatever CW supplies New Zealand may have had in the Pacific [discussed in sect 9.2], New Zealand had a substantial reserve of chemical weaponry kept in New Zealand during the war and disposed of soon afterwards.

As far as is known New Zealand had only two kinds of CW munition, the 25-pounder artillery shell and 4.2-inch mortar rounds. The 25-pdr shells have already been described in sect. 9. Much less is known about the mortar shells.²¹⁰ A British Army team arrived in

²⁰⁸ NA, Air, 133/8/1.

²⁰⁹ NA, Air, 133/8/1.

²¹⁰ The 4.2 inch (107 mm) mortar had a range of up to 3000 m and was a large heavy weapon generally assigned to artillery rather than infantry units, detested by the troops for its habit of occasionally dropping a round about 1000 m short, (often on the forward officer controlling the fire) Each bomb weighed about 10 kg and contained about two litres of mustard.

New Zealand in May 1943 to demonstrate the 4.2 inch mortar in a CW role.²¹¹ On at least one occasion the American COMSOPAC requested a 'quantity of gas shells from New Zealand for the Solomons'.²¹² This request was probably for mortar shells.²¹³

10.1 Storage

At some stage during World War 2, probably in 1942, New Zealand began taking delivery of large quantities of ammunition 'as a reserve for the use of our forces in the Pacific and for the forces mobilised for the defence of this country'.²¹⁴ A series of magazine areas was constructed at suitable strategic points between Auckland and Christchurch. Of these Belmont, high up on the hills between Lower Hutt and Porirua, was the most important. An old file on this installation in the National Archives provides most of what little is known about the domestic CW stockpile. According to a 1942 marginal annotation in this file 'a total of 112 770 rounds of 25 pounder' were ordered.²¹⁵ Of these it was recommended that 30 000 25-pdr rounds go to Auckland, a further 30 000 go to 'Burnham' and the remainder, 52 770 rounds, go to Belmont. It was recommended that a further quantity of (apparently) 15 300 (or possibly 10 300) B4 and Y4 chemical bombs for 4.2 inch mortars also be stored at Belmont.

Construction of the Belmont magazines began in September 1942, and by October was being given urgency 'in order to relieve the congestion of ammunition arriving from overseas'.²¹⁶ Belmont was ultimately to consist of 62 magazine buildings, each about 80 by 20 feet by about 10 feet high.²¹⁷ It was decided in February 1943 that no special design was needed to accommodate the chemical rounds, but that two buildings would

²¹¹ NA, EA-1, W2619, 80/6/1.

²¹² NA, EA-1, W2619, 80/6/1.

²¹³ The US used the 4.2 in mortar, and had filled 645 000 rounds with chemical agents, 84 % of them with mustard. [Prob-2, pp. 82-83]

²¹⁴ NA, AD-1, 203/317.

²¹⁵ NA, AD-1, 203/317, 7 December, 1942.

²¹⁶ NA, AD-1, 203/317, 19 June 1946.

²¹⁷ Belmont was the biggest munitions storage facility ever constructed in New Zealand. It spread over 320 acres with 13 km of internal roads, and contributed 17,310 tons to New Zealand's total ammunition storage capacity of 48,697 tons, with Waiouru having the second greatest capacity, of 6,669 tons. [NA, AD-1, 203/173/2.]

be 'selected in an isolated position and with reference to the prevailing wind'. These buildings still had not been selected by March 1943. Construction proceeded much more slowly than anticipated. In July one million pounds worth of ammunition was still stored under canvas and deteriorating, and no buildings had been completed. By September 14 magazines were 'approaching completion'. Magazines 28 and 29 (near the western end of the present airstrip) were chosen to hold the chemical rounds, and they were filled probably some time in late 1943.

The file reveals all sorts of further problems at Belmont. The soldiers staffing the base suffered ill health from explosive fumes and the exposed working conditions. The magazine roofs began leaking soon after completion. None of the problems, however, seem to have involved the chemical rounds, which, after mid-1943, are hardly mentioned anywhere in the file.

It is not possible to determine if the chemical munitions were split up between Auckland, Belmont and Burnham, as was suggested in 1942. If any chemical munitions did go to the Auckland area then they probably went to two magazine facilities which were being constructed near Ngaruawahia to accommodate reserve stocks. If any chemical munitions went south, then they probably went to the magazines being constructed at several locations along the inland margin of the Canterbury Plains,²¹⁸ rather than to Burnham Army Camp, which had relatively restricted magazine accommodation.

If, as described above, only two magazines were devoted to chemical munitions, a consideration of tonnages involved suggests that the chemical munitions were divided up between the three installations. The 4.2-inch mortar bombs weighed about 20 pounds each, so their total weight would have come to about 140 tons. Assuming the 25-pdr shell did in fact weigh 25 pounds the 52 770 rounds stored at Belmont would have weighed 590 tons. The total of 630 tons could have been accommodated in two of the magazines, which on average held about 280 tons each of ammunition. Signs still readable on the magazines indicate each magazine had a maximum capacity of about 450 tons of ammunition.

New Zealand's World War 2 domestic CW stockpile compares in size with that held until recently by the United States at Clausen in Germany, and now maintained on Johnston Atoll pending eventual destruction. The ex-Clausen stockpile consisted of 102,000

²¹⁸ NA, AD-1, 203/173/2.

rounds for 155 and 203 mm howitzers, making up 2000 munition tons and containing about 390 metric tons of agent. This constitutes about 5% of the currently usable US arsenal. The Ex-Clausen shells are filled with nerve gases far more toxic than the New Zealand mustard however. A lethal percutaneous dose of mustard is about 4.5 gm²¹⁹, and there would have been about 300 agent tons in the NZ stockpile, so that in theory it contained something like 60 million lethal doses.

10.2 Disposal

Vast quantities of excess and obsolescent ammunition were dumped at sea by New Zealand after World War 2. Chemical munitions were amongst those dumped. Just what the total amount dumped was cannot be determined from the surviving file²²⁰, but two occasions are documented:

- * In April 1946 the hulk Rosomund was towed out to the 100 fathom line in Hauraki Gulf by the tug Maui Pomare from Auckland and scuttled. It was carrying 200 tons of chemical shell.
- * In October 1946 some 1500 tons of 25 pdr chemical shell and 20 tons of bombs²²¹ were dumped off Wellington by the Marine Department steamer Matai (normally used for lighthouse replenishment etc).

The location for the latter dumping was described as lying 50 nautical miles off Pencarrow Light on a bearing of 134 degrees.²²² Assuming this is correct then the munitions are at about 175 deg 40' E, 41 deg 55' S, or about 45 km SE of Palliser Head, and well to the east of Cook Strait. Water depths here are of the order of 2800 metres, well beyond trawling depth.

²¹⁹ Prob-1, p. 86.

²²⁰ NA, N-1, 14/10/39, 'Disposal of unserviceable ammunition'.

²²¹ 'Stored since 1943 at a dump near Belmont are 1500 tons of 25 lb shells and 20 tons of bombs, filled with the gas [ie mustard]'. 'Disposal of gas shells', Dominion, 21 September 1946.

²²² NA, N-1, 14/10/39, memo from Naval Secretary to Army Quartermaster-General. This location is somewhat suspect in that any attempt to follow such a course would involve sailing over land for several miles.

There was no secrecy about the Wellington operation, and it was mentioned several times in the local newspapers. One article²²³ described how the 'cargoes of deadly potential' would be rendered innocuous before being loaded on the ship. Firing mechanisms were to be removed, the rounds would be packed in sand and the cases sealed. A gas-detecting substance would be painted round the seals.

The cargo will be jettisoned from specially constructed chutes, the men concerned with the work being provided with safety material including capes, respirators and gloves, though there is no suggestion that an emergency will arise, as all possible precautions are being taken.

Loading took place at the military wharf at Shelly Bay, and was carried out by soldiers. On each sailing some 250 tons were dumped by the civilian Marine Department crew.²²⁴

Given the incompleteness of the surviving documentation it is quite possible that other quantities of chemical weapons were dumped on other occasions. That this is the case is suggested by technical instructions issued for the dumping of munitions from the vessel *Isa Lei* in 4 July 1957²²⁵ which included the following:

In addition to these instructions the precautions concerning handling and transport of chemical warfare ammunition will be observed. These are contained in RAOS VOL 3 PAM 7.

Assuming that the dumped tonnages mentioned above refer to munition tons rather than agent tons, and that they do not include the sand and steel box packaging, then it would seem that something like 135 000 25-pdr rounds and 2200 mortar bombs were dumped. The 25-pdr figure is in reasonable agreement with the figure already quoted for the total number of rounds acquired by New Zealand in 1942, rather than the lesser number of rounds initially allocated to Belmont in 1942. In general munitions were dumped from the port which lay nearest to the magazines, and it seems unlikely that mustard stocks

²²³ 'Gas shells to be dumped by Matai, fifty miles at sea' *Dominion*, 1 October, 1946.

²²⁴ Some of the crew were interviewed in A Hubbard, 'Chemical war: Our seabed legacy', *NZ Listener*, 16 January 1993.

²²⁵ NA, N-1, 14/10/39.

from Auckland and Burnham were railed and shipped to Wellington before being dumped by the Matai.

If all 112 770 25-pdr rounds were stored at Belmont for the duration of the war then at least four of the Belmont magazines must have been given over to mustard storage. However the number of mortar bombs dumped seems to be some 13 100 rounds short. The 200 tons of mustard munitions dumped in the Hauraki Gulf may account for the shortfall, or it may be that 13 100 rounds were supplied to satisfy the US request mentioned above [Sect. 10.0]. On the other hand the 200 tons known to have been dumped in the Hauraki Gulf may have been munitions held by New Zealand in the Solomons and brought back to the Auckland area in 1944.

There seems to be no way of totally reconciling the various figures. About all that can be said is that New Zealand had at least 128 070 rounds of mustard munitions during the war, and at the end of the war New Zealand dumped at least 15 220 tons of mustard munitions. This leaves completely open the possibility that New Zealand had further quantities stored in the Pacific, or that New Zealand was maintaining further stocks acquired well before the war. Nevertheless, in the absence of better information, it seems reasonable to give New Zealand the benefit of the doubt, and assume that it got rid of all its CW munitions in 1946 and had nothing further to do with CW after 1946, with some minor exceptions discussed in section 11.

10.3 Environmental consequences of ocean dumping

Immediately after World War 2 New Zealand began disposing of large quantities of ammunition by dumping at sea. New Zealand seems to have been stockpiling ammunition in vast quantities right throughout the war, and at the end of the war magazines were full almost literally to bursting point.²²⁶ Perusal of a Navy file on the subject²²⁷ indicates that from the end of the war up until 1958 some 19 500 tons of ammunition were dumped at

²²⁶ This was particularly the case at Kauri Point, Birkenhead, Auckland where the Navy was very worried about the excessive quantities of mixed incompatible explosives held there. A 1952 memo about this noted

A third problem which has not, as yet raised its head, is the public dismay and outcry which would arise throughout the Dominion were these conditions to become known, particularly to the residents of Birkenhead. It is in fact strange that some rumour has not started already. [NA, N-1, 14/10/39-2]

²²⁷ NA, N-1, 14/10/39, 'Disposal of unserviceable ammunition'.

various locations around the New Zealand coastline. Munitions from Auckland and Ngaruawahia were dumped mostly in the Hauraki Gulf, munitions from Belmont were dumped off Wellington, Canterbury area munitions were dumped around Banks Peninsula, and so on.

In general the dumping of ammunition seems to have been carried out in a somewhat chaotic way, with little record being kept of where ammunition was dumped. The vessels and other equipment used in dumping were often not adequate for the task. On several occasions in the 40s and 1950s fishermen brought up recently dumped ammunition in their nets from depths of 100 metres or less. The Navy admitted that they had on occasion misjudged their dumping locations, and on one occasion explained that a good echo-sounder was needed to find the correct 'hole' in the sea bottom, and that the echo-sounder on the naval auxiliary being used, the *Isa Lei*, 'was nearly always unserviceable'. There were complaints from the Marine Department, the NZ Oceanographic Institute and Victoria University marine biologists in the mid 1950s about ammunition being dumped on hard bottoms in Cook Strait where scouring prevented any accumulation of mud which eventually would bury the ammunition.

The advent of recreational scuba diving now means that much of the ammunition dumped, especially in the Hauraki Gulf, is a far greater hazard to human life than could have been foreseen in the 1940s.²²⁸

There seems little doubt that intense dislike for chemical weapons was the reason why the NZ stocks were got rid of so soon after the War ended, and there seems to have been little consideration given at the time to the possible environmental consequences of dumping mustard gas munitions at sea.

In seeking from the Navy a suitable location off Wellington to dump the mustard, the Army quartermaster-general observed:

As [United Kingdom?] War Office regulations say that this type of shell should NOT be dumped within 50 miles of the nearest fishing grounds and due regard should be paid to currents likely to bring any shell up on to beaches, would you please advise the spot out of Wellington that would meet these requirements.

²²⁸ A Hubbard, 'A danger to divers', NZ Listener, 16 Jan 1993.

That seems to have been the sum total of environmental impact assessment carried out at the time. It seems however that the Wellington mustard gas was dumped at sufficient depth to be well beyond the range of trawlers, and does not seem to have given rise to any subsequent problems or complaints.

This has not been the case with mustard gas dumping elsewhere. At least 21 and possibly as many as 50 ships loaded with 303 000 munition tons of allied mustard and German nerve gas weapons were scuttled off the coasts of Norway, Sweden and Denmark at the end of World War 2. The Soviet Union also dumped something like 50 000 tons of chemical munitions into the Baltic after World War II. Most of this was in fairly deep water but some is in quite shallow water only a few miles off-shore. The munitions have been corroding steadily since, and mustard gas has leaked from them, in the form of a jelly-like substance which lies around on the sea floor without mixing in the seawater. Danish and Swedish fishermen often find soap-like lumps of mustard gas jelly attached to trawl nets, and on occasion Danish fishermen have been badly burnt by handling such nets. So far, it seems, no study has been done of the possible environmental effects.²²⁹

Apparently in the deeper and colder Scandinavian waters the mustard remains relatively inert. As the shells corrode away, the jelly-like lumps are left on the sea floor, covered by a crust formed by seawater hydrolysis. Only slightly denser than the seawater (1.27 gm/ml at 20 deg C), the blobs are being carried by bottom currents for distances of up to 80 km, and thus are turning up in fishing grounds.²³⁰

The New Zealand munitions are of roughly the same vintage as those in the Baltic, and are presumably in a similar state of disintegration. Cook Strait is known for its strong currents, but, if mustard blobs are being transported anywhere at that depth it will probably be eastward and downward into the Hikurangi Trench.²³¹ The location for dumping was possibly chosen with this in mind. If so the choice shows more care and forethought than was demonstrated in most of the other ammunition dumping operations of the 1940s and 1950s.

²²⁹ F Laurin, 'Scandinavia's underwater time bomb', *Bulletin of the Atomic Scientists*, March 1991, pp. 10-15.

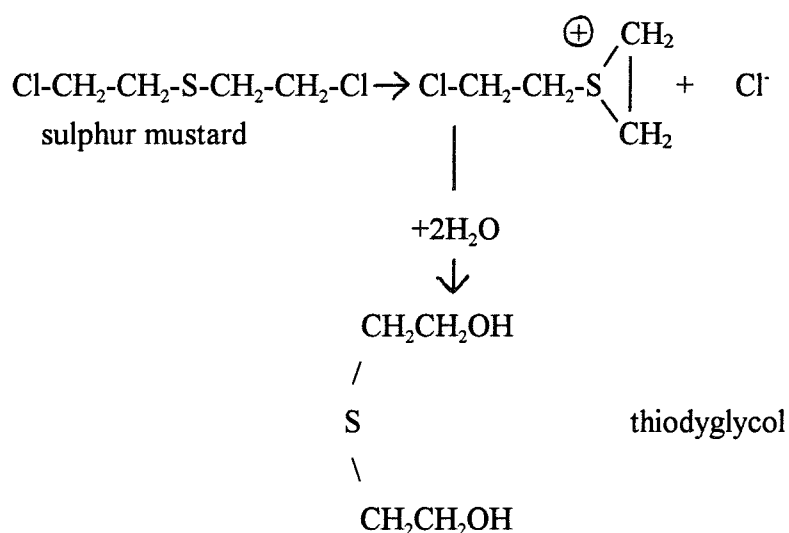
²³⁰ F Walker, 'Europe's chemical timebomb', *The National Times (Australia)*, 18-24 May, 1984.

²³¹ T F W Harris, *Greater Cook Strait: Form and Flow*, DSIR Marine & Freshwater, Wellington 1990.

According to the US Army,²³² with age mustard gas will degrade into hydrochloric acid, hydrogen sulphide, ethylene, ethylene dichloride, 2,2-dichlorodiethyl disulphide and vinyl chloride. The first three of these should have only modest environmental effect, but the last three are chlorinated hydrocarbons, which may persist for some time and give rise to the problems characteristic of other chlorinated hydrocarbons, such as DDT, 2,4,5-T, and PCBs. Ethylene dichloride and vinyl chloride are regarded as particularly intractable, although microbial degradation of them does take place eventually.²³³

In seawater the dominant reaction is hydrolysis. This is slowed by the immiscibility of mustard and the formation of a skin of hydrolysis products.

The reaction goes by a variety of pathways to yield mostly thiodiglycol ($C_4H_{10}SO_4$) and chloride ions.²³⁴



Thiodiglycol is not a chlorinated hydrocarbon, and presumably should not give rise to particularly adverse environmental effects. The chloride ions would be indistinguishable

²³² Chemical Stockpile Disposal program: Final Programmatic Environmental Impact Statement, US Army, January 1988, Vol 3, p. A-19.

²³³ A Picardi, P Johnston, R Stringer et al, Alternative technologies for the detoxification of chemical weapons: An information document, Greenpeace International, Washington DC, 1991.

²³⁴ R Trapp, The Detoxification and Natural Degradation of Chemical Warfare Agents, SIPRI Chemical & Biological Warfare Studies, 3, Stockholm, 1985, pp. 4 & 7.

from all the other chloride ions in the sea salt (sodium chloride). Dissolved mustard is 99% hydrolysed in 110 minutes at 20 deg C. No doubt minor quantities of intractable organochlorines are also formed. Greenpeace²³⁵ quotes a US Army publication as indicating that bis-2[bis(2-hydrolethyl)sulphonium ethyl] sulphide dichloride ($C_{12}H_{28}S_3Cl_2$) is amongst the other decomposition products in water.

The tentative conclusions that can be drawn from all this is that the NZ mustard gas was dumped at sufficient depth to be out of the way of trawlers, and that to the extent that any reaction is taking place with seawater it is resulting in relatively harmless end products. It may be that dumping on a deep sea bottom was then the best thing that could have been done with the mustard, from an environmental viewpoint. It would have been preferable (but more dangerous for the workforce) if the mustard had been removed from the munitions and emulsified with seawater before being discharged from a deep hose. This would have allowed scrap recovery of the cartridge cases etc.²³⁶

11 CHEMICAL WEAPONS AND ARMS CONTROL 1946 - 1992

Since the World War 2 stocks were dumped in 1946 it seems that New Zealand has had only very minor involvement in offensive CW. If it is accepted that defoliants and tear gas are CW agents then New Zealand has possibly been involved in the production of one in the post-war era and probably still possesses the other. And New Zealand has, at least until recently, regarded defoliants and tear gases as CW agents. A briefing supplied by the External Intelligence Bureau (EIB) of the Prime Minister's Department to the parliamentary Select Committee on Disarmament and Arms Control included the following:

Chemical agents are toxic substances which incapacitate through their physiological effects. The most lethal agents are nerve gases and toxins. Chemical weapons such as the blood, blister, vomit and choke agents have diminished in relative importance.

²³⁵ Picardi and others, Table B.19, p. B-129.

²³⁶ G S Hartley, a former Porton scientist now retired at Havelock North, pointed out [pers comm] the advantages of disposing of organochlorines at sea 'where the element so unpopular in the atmosphere is put back where it belongs as chloride ion in the company of millions of millions more'.

Non-lethal agents include riot control irritants, hallucinatory-incapacitants [sic] and defoliants.²³⁷

11.1 Defoliants

The military use of defoliants acquired notoriety from massive use of Agent Orange by the US Air Force against Vietnam in the late 1960s. Its use ceased only after the evidence for dioxin impurities causing birth deformities became too obvious to deny. Much lesser known, however, is the fact that the active ingredients of Agent Orange, 2,4-D and 2,4,5-T, were originally discovered and developed as CW agents by the British during World War 2.²³⁸ Britain shared the data with the US in time for the use of defoliants against Japan to be considered. Britain further developed military defoliants after the war, and used them extensively in Malaya during the Communist insurgency there.²³⁹ New Zealand fought alongside Britain during the so-called Emergency, and it is still an open question whether New Zealand participated in the use of defoliants there.

During the Vietnam war the US was using defoliants on such a vast scale that a worldwide shortage of the active ingredients developed. New Zealand efforts in 1967 to produce Agent Orange for this war are described in documents made available to a parliamentary Select Committee.²⁴⁰ A New Zealand subsidiary of the Dow Corporation²⁴¹, Ivon Watkins-Dow, was producing modest quantities (up to 80,000 gallons per year) of 2,4-D and 2,4,5-T at a price lower than the USAF was paying. The only problem was, as described by the Secretary of Defence, that 'of getting the stuff to South Vietnam'. Consideration was given to the use of RNZAF transport aircraft to fly the defoliant to Vietnam. However it was found that it would cost three times as much to fly the defoliant as would be earned in foreign exchange. Later the US Embassy revealed

²³⁷ dated 12 October 1982. Copy in authors' possession.

²³⁸ J Perrera & A Thomas, "This horrible natural experiment", *New Scientist* 18 April 1985, pp. 34-36.

²³⁹ *New Scientist*, 19 January 1984, p. 6.

²⁴⁰ These documents, as well as the Select Committee findings, are quoted and discussed at length in O Wilkes, 'New Zealand tried to sell Agent Orange to the USAF and Sonja Davies was part of the Cover up', *Foreign Control Watchdog*, (Campaign against Foreign Control in Aotearoa, Christchurch) October 1991.

²⁴¹ Dow was then notorious for its production of napalm and defoliant for the war against Vietnam.

that it had already carried out a survey of production possibilities in New Zealand and decided that the Ivon Watkins plant could not produce in the quantities needed by the USAF. The Embassy was however interested in using an Auckland Company called Polymer Proprietary (now A C Hatrick) which 'on a Japanese supply of material, could produce half a million gallons per year'. Whether or not the Polymer proposal came to fruition is not known. Polymer had no production plant, and would merely have been mixing chemicals shipped separately from Japan, so this was obviously a 'laundering' operation that was being proposed, Japan being prevented by its Peace Constitution²⁴² from exporting armaments.

The New Zealand Government has attempted to suppress information about the defoliant supply proposals, both at the time and subsequently. The Ministry of Defence will not allow access to the relevant files. The Select Committee which investigated the matter in 1989-90 (in response to pressure from Vietnam veterans worried about health effects) professed in its final report to be unable to establish whether defoliant production took place or not.

11.2 Tear Gases

As far as is known the only chemical munitions held by the NZ armed forces are tear gas grenades carried on RNZN ships. These seem to date back to 1948, when the British Admiralty authorised naval landing parties to use 'tear smoke grenades N° 92'. The Chief of Naval Staff at that time pointed out to the Minister of Defence that because the Royal New Zealand Navy had responsibility 'for law and order in certain United Kingdom dependencies' a decision by the NZ government was needed on 'whether RNZN ships should embark an outfit of these grenades (considered the most humane method of quelling riots) for use in aid of a civil power outside New Zealand'.²⁴³ Presumably the UK dependencies in question were Fiji, Solomons, New Hebrides and Pitcairn. These dependencies have all, with the exception of Pitcairn, since become independent. It is hard to imagine that the possibility of riots on Pitcairn would justify carrying tear gas, yet RNZN ships have continued to carry tear gas until at least as recently as 1987. In that year a petty officer from the RNZN frigate Canterbury was convicted for discharging a

²⁴² ie the Constitution imposed on Japan by the US as a condition of the Peace Treaty ending the US occupation of Japan.

²⁴³ NA, EA-1, 80/6/2, 'Use of tear gas in aid of the civil power'.

tear gas canister on a wharf at Cairns, Queensland. The officer was attempting to clear people off the wharf during a tug-of-war. Vomiting by patrons at a nearby hotel was blamed on the tear gas, but bystanders closer to the discharge suffered only watery eyes and runny noses.²⁴⁴

The NZ police are also equipped with tear gas. The author has seen spent cartridges from police exercises. These shells are labelled 'A/RIOT IRRIT L2A2 CS'. 'CS' is the US Army designation for 2-chlorobenzalmalononitrile, about 8000 tons of which were used by the US in Vietnam. NZ police have been equipped with it at least since 1973, and have used it on several occasions.

11.3 New Zealand and chemical warfare disarmament

New Zealand's voting record on CW-related resolutions in the UN General Assembly has been reasonably positive from an arms-control viewpoint. Chemical warfare first became an issue there in 1966 when global concern was building up over US use of defoliants and tear gases against Vietnam. The US argued that herbicides and tear gases were not chemical weapons and therefore not prohibited by the Geneva Protocol (which the US had not signed anyway). The evidence was against this interpretation.²⁴⁵ US military manuals classified herbicides and tear gases as CW and the Geneva Convention banned "Asphyxiating, Poisonous or Other Gases and ... all analogous liquids, materials or devices...."

A 1969 UN General Assembly resolution called for strict observance of the Geneva Protocol. This resolution included herbicides in its definition of CW and was directed against the US, without specifically naming the USA as a violator. It passed with 80 votes and 36 abstentions. Only the US, Australia and Portugal voted against it. Australia was also using defoliants in Vietnam, though on an insignificant scale compared with the US, while Portugal was using herbicides on a significant scale against liberation movements in its African colonies. New Zealand, to its credit, merely abstained.

²⁴⁴ Navy officer in teargas 'prank', Dominion Sunday Times, 31 May 1987.

²⁴⁵ All the arguments are summarized in Wil D Verway, *Riot Control agents and herbicides in war: Their humanitarian, polemological and legal aspects*, Sitjthoff, Leyden, 1977.

There were also diverse efforts to strengthen the Geneva Protocol. Several UN General Assembly resolutions supported by New Zealand called on all nations to become party to the Geneva Protocol. These were directed particularly at the United States, which had still not signed. In 1969, responding to the pressure, the US president agreed to respect the provisions of the Protocol with respect to lethal and incapacitating chemicals, but not with respect to tear gases or herbicides. The US claimed that since these substances were used domestically in the US and elsewhere (for riot control and in agriculture), their use could not be banned effectively. The US also claimed that the use of tear gases could actually lead to fewer enemy deaths.

Against this the disarmers argued that in fact there was no clear boundary between lethal gases and tear gases and that tear gases were often used to increase the effectiveness of other lethal weapons (the 'force multiplier' effect). Use of tear gases was likely to escalate to use of lethal gases. Use of tear gases was likely to be mistaken for or misrepresented as use of poison gases. Similar arguments applied to herbicides, which in addition caused environmental damage.

There were also strong domestic pressures on the US government. Much of this was related to growing opposition to the US war in Vietnam. A disastrous incident in Utah, in which 6000 sheep died as the result of unforeseen nerve gas drift during a CW exercise, led to the USA shutting down CW production lines and ceasing outdoor experimentation in CW in 1969.

In 1974 the US partially yielded to the international pressure. President Ford ordered that herbicides could be used only in the vicinity of US bases, and tear gas could only be used when it would save lives (eg in rescue operations) or against rioting prisoners of war. In 1975 the US ratified the 1925 Geneva Protocol, with the reservation that it considered it to ban only first use of CW.

By 1980 the US had seized the moral high ground, and began making allegations about CBW use by the Soviet bloc.²⁴⁶ The most spectacular allegation was that pro-Soviet

²⁴⁶ None of these highly publicized charges were substantiated, and in the case of the BW allegations the US did not bother to press them through the channels provided for in the BWC. The CW allegations were not confirmed by a UN Committee of Experts set up to investigate them. The US claimed it had "secret" evidence which justified the charges but refused to reveal any of it. Instead the US Information Agency distributed brochures worldwide, and even purchased advertising space in newspapers to spread the allegations. The Reagan administration claimed that the "compelling" evidence for Soviet bloc violations ruled out any chance of achieving CW arms control with the Soviet Union, and

irregular forces had been spreading a fungal-derived mycotoxin in the form of 'yellow rain' in Laos. The 'yellow rain' eventually turned out to be pollen-stained bee-shit, the product of mass defecation by in-flight bee-swarms.²⁴⁷

Under US pressures the western bloc was sponsoring resolutions in the General Assembly condemning these alleged instances of CW use by the Soviet bloc. New Zealand came under US pressures to support these resolutions. One example of this is described in a restricted EIB memo to the parliamentary Select Committee on Foreign Affairs dated 8 June 1982. The memo described US documents alleging Soviet CW use in Afghanistan (never substantiated), and in Laos (the 'yellow rain' fabrication), and added that

.... a United States briefing team visited a number of capitals including Wellington in April this year to present further information and to seek international support in their case against the USSR. The briefing amplified earlier claims and presented fresh evidence....²⁴⁸

The EIB noted that there was neither 'strong international support' nor 'objective scientific evidence' for the US claims, but that New Zealand had nevertheless 'accepted the American views in respect of Laos'. In Afghanistan 'the evidence for the use of chemical weapons is not as strong as in Southeast Asia'. Despite not being convinced of the validity of US claims New Zealand voted with the US for the relevant resolutions.

justified the US proceeding with its binary CW rearmament program.[SIPRI Yearbook 1983, chap 14, 1984, p. 332.]

²⁴⁷ SIPRI Yearbook 1985, p.183. The US attempted to explain away the pollen by saying it was added by the Soviets to improve dispersal of the mycotoxin. When further research showed that the pollen grains appeared to show signs of having passed through the digestive tract of a bee the US responded that obviously the Soviets gathered the pollen from beehives, and that spy satellite pictures had shown apiaries near Soviet BW installations. This explanation was obviously total nonsense. Bees do not eat the pollen they collect, but carry it back to their hives in pouches on their legs for feeding to larvae. As US 'explanations' became more contorted it became obvious that the yellow rain accusations were a product of US paranoid misinterpretation, rather than of a conscious US disinformation effort. The bee shit explanation is now universally accepted.

²⁴⁸ Copy of document in authors' possession.

New Zealand possibly played a role in the yellow rain fabrication. The 1984 SIPRI Yearbook²⁴⁹ claimed that New Zealand was amongst those countries whose laboratories had confirmed the presence of mycotoxins in yellow rain samples. This was subsequently denied by the NZ Ministry of Foreign Affairs.²⁵⁰ However there are NZ Department of Scientific & Industrial Research documents which indicate that New Zealand made preparations to examine yellow rain samples on behalf of the UN in 1983.²⁵¹

In the 1980s New Zealand became a reasonably enthusiastic supporter of the campaign in the Conference on Disarmament and the UNGA to establish a Chemical Weapons Convention (CWC). New Zealand withdrew its reservation to the Geneva Protocol about right of retaliation in 1989.

In November 1990 NZ undertook a 'national trial inspection' to determine the feasibility of a small country inspecting a chemical plant to verify non-production of CW agents and compliance with a CWC. The mock inspection was carried out at the Ivon Watkins-Dow (now Dow-Elanco) herbicide plant suspected of producing defoliant for the Vietnam war in 1967. The 'inspection' was said to be successful in that the 'inspectors' were able to satisfy themselves that no CWE agents were being produced.²⁵² Ironically this inspection took place within a few months of the Select Committee announcing that it was unable to determine whether military defoliant production had taken place at that very same plant in the '60s.

The trial inspection report was presented to the Committee on Disarmament in Geneva in February 1991 by the NZ permanent representative to the CD. In the course of his speech the representative, a professional diplomat, made the following astonishing statement:

²⁴⁹ World Armaments and Disarmament: SIPRI Yearbook 1984, Stockholm, 1984, p. 334. The Yearbook was quoting the US Congressional Record (Senate, 13 July 1983, p S-9784.

²⁵⁰ In a letter from H A Willberg to O Wilkes, 22 March 1985.

²⁵¹ Dated 5 & 9 August 1983. One of them bears the annotation "Remember we have been asked not to broadcast our involvement". In the possession of the author.

²⁵² 'New Zealand: report of a National Trial Inspection', UN Conference on Disarmament CD/1057, CD/CW/WP.331, 13 February 1991.

New Zealand does not have, and has never had chemical weapons. We do not allow chemical weapons to be stationed on our territory.²⁵³

More untruths could hardly be squeezed into two such small sentences. New Zealand does have chemical weapons - on board RNZN ships, if nowhere else. New Zealand has had chemical weapons - in both World Wars. New Zealand has taken no steps to prevent stationing of CW agents, and the NZ Nuclear Free Zone, disarmament and Arms Control Act makes no reference to CW at all.

There is no agreement with the US to prevent it bringing chemical weapons into its Deepfreeze base at Christchurch airport, and New Zealand has relinquished any inspection rights over those facilities.

11.4 New Zealand and the CWC

New Zealand is now a signatory to the CWC, one of several arms control agreements which New Zealand is realistically capable of violating. New Zealand has both owned and used chemical weapons of the sort soon to be banned by the CWC, as summarized below, and for all we know could still ageing stocks of such weapons in the future.

The facts about the history of New Zealand's ownership and use of chemical weapons are still not clear. However research undertaken in the NZ National Archives over the past 12 months and already summarized in this report discloses the following CWC-relevant activities as a minimum:

1 New Zealand forces used chemical weapons in Belgium and France during World War I on about the same scale, relatively speaking, as did British forces, and about as indiscriminately. Toxic phosgene and non-toxic tear gas seem to have been the main agents used. In at least one instance NZ artillery seems to have bombarded a town containing civilians.

2 New Zealand apparently first became interested in acquiring its own reserve stocks of gas shell about the time the Geneva Protocol on gas warfare was signed in 1925. Whether such stocks were then actually acquired is still not clear.

²⁵³ Statement by HE Mr Timothy Hannah.... As delivered' NZ permanent mission, observer delegation to the Conference on Disarmament, 21 February 1991. Available from Ministry of External Relations & Trade.

3 New Zealand actively supported retention of the 'right' of chemical retaliation when the question of banning CW entirely was raised at the 1932 Disarmament Conference.

4 During World War 2 New Zealand was involved in research, development and production of CW weaponry.

5 During World War II New Zealand acquired a considerable quantity of chemical weapons. Some may have accompanied the 3rd Division to the Pacific. The main stockpile was stored at Belmont between 1942 and 1946, and included

112 770	rounds of 25-pounder mustard shell
15 300	gas bombs for 4.2-inch mortar.

6 The ultimate fate of this CW arsenal is not clear. Some may have been transferred to US forces in the Pacific. In 1946 some 1500 tons of 25 pounder shells and 20 tons of mortar bombs were dumped off Cape Palliser. This would be equal to about 135 000 shells and 2200 gas bombs. A further 200 tons were dumped in Hauraki Gulf. Other gas munitions may have been dumped as late as 1957.

7 RNZN ships apparently continue to carry tear gas munitions for riot control operations 'in aid of the civil power'.

A cursory examination of the text of the CWC indicates that the following obligations are possibly pertinent with respect to New Zealand, given that New Zealand has been involved in CW and preparations for CW to at least the extent described above.

Art. I. General obligations

1. NZ must undertake never to develop, stockpile, transfer, use or prepare to use chemical weapons. (NZ has done all these things in the past.)

2. NZ must destroy all chemical weapons (not including tear gas or defoliants²⁵⁴) it possesses or which are located on its territory.

5. NZ must undertake not to use riot control agents - ie tear gas - as an agent of warfare.

²⁵⁴ Defoliant use in war is, however banned by the ENMOD Convention - the Convention on the prohibition of military or any other hostile use of environmental modification techniques - to which New Zealand is a signatory.

Art. III. Declarations

1. NZ must declare within 30 days of the CWC entering into force (a) whether it owns or hosts any weapons, whether it has received or transferred any chemical weapons since 1946, and where such weapons are located and in what quantities etc; (b) whether it has any unusable older (1925-1946) chemical weapons.

Art. IV. Chemical weapons

1-5. NZ must provide access to all chemical weapon storage locations immediately after making the declarations called for in Art. III, to allow on-site verification by the Organization to be set up to administer the CWC.

7. NZ must destroy all chemical weapons within ten years of the CWC coming into force, and supply documentation on the destruction process.

10. NZ must assign highest priority to the safety of people and to protecting the environment during any such destruction.

Art. VII. National Implementation measures

1. NZ must enact legislation prohibiting within NZ, all those activities banned under the CWC.

Given New Zealand's somewhat dubious history of CW activity it would be helpful if New Zealand were to fulfill its obligations well in advance of the Convention coming into force, since this is not expected to happen before 1995, and a lot of things could happen between now and then to delay the process.

In particular it would seem useful for New Zealand to make the declarations required under Article III in the very near future. Presumably such declarations would require some admission that the statement made by Mr Tim Hannah on behalf of New Zealand at the UN Conference on Disarmament on 21 February 1991 was untrue.

According to Art III, section 2 there is no obligation to make declarations about chemical weapons dumped at sea before 1985. However given the incompleteness of the available records it is by no means clear whether all NZ chemical weapons have been so disposed of, and this is another reason why it is important that New Zealand make the Article III declarations, and not make use of the section 2 loop-hole.

There would also seem to be some ambiguity with respect to the tear gas - or 'riot control agents' - carried by NZ ships. What New Zealand might claim was 'aid to the civil power' of another country, eg. Fiji, might be seen by others as an act of war. Any use of tear gas overseas could therefore be interpreted as a violation of Art. 1, sect. 5.

The US Operation Deepfreeze installation at Christchurch Airport might raise some special problems for New Zealand. New Zealand has chosen to recognize the sovereign immunity of Deepfreeze aircraft, does not inspect their contents, and has given them blanket exemption from the Nuclear-free Act. New Zealand should insist on having access to US military aircraft for purposes of verifying their compliance with the CWC, or at the very least seek assurances from the US that these aircraft are in compliance with the CWC.

The CWC is the one arms control agreement on which New Zealand cannot take a holier-than-thou position. In the case of other agreements New Zealand has been able to take the attitude that it has signed them to increase the pressure on other countries to stop doing things which New Zealand has never done nor wants to do. Where chemical war is concerned New Zealand needs to acknowledge that it is one of the guilty parties against which the CWC is directed. New Zealand has owned these weapons, has used them, has dumped them with little regard for environmental consequences, and has lied in an international forum about its ownership. In these circumstances there is a special obligation on New Zealand to abide by the CWC and be seen to be abiding it, and preferably in advance of other countries at which New Zealand might be tempted to point an accusatory finger.
