NEW ZEALAND OBSERVERS AND INDOCTRINEES AT NUCLEAR WEAPON TESTS: 1956-1958

Introduction

In the first years of the nuclear age New Zealand supported the development of atomic and later thermonuclear weapons by its allies the United States of America and Great Britain. Consistent with this policy the New Zealand Armed Forces became involved in nuclear weapon testing. In 1952 Royal New Zealand Air Force aircraft based at Whenuapai assisted with the monitoring of radioactive fallout from the first British atomic bomb test, which was conducted off the northwest coast of Australia in October.[1] As part of the fallout monitoring programme for the British tests in Australia, Royal New Zealand Air Force personnel in Fiji collected rain-water samples. A small RAF detachment carried out the same task at RNZAF Base Ohakea.[2]

Maralinga 1956: Operation Buffalo and the Indoctrinee Force

Early in 1956 the New Zealand Chiefs of Staff learned that the British and Australian Governments planned to send a large group of observers to the atomic weapon tests to be held at Maralinga in Australia, which had the codename Operation Buffalo. Although the term 'observer' was used in the initial correspondence, the New Zealand authorities knew that any personnel sent to take part in this programme would do more than simply observe the detonation of atomic bombs. The New Zealand Chiefs of Staff considered that it would be useful for New Zealand to send a group of observers who would "see and hear the atomic explosion and go back to their units able to pass on first-hand information of their experience."[3] The Chiefs of Staff asked the British military authorities if New Zealand could send up to 20 personnel from all three services to the test programme.[4] The number of observers who could attend the tests was limited, but the British authorities agreed to reduce the number of their observers so that five New Zealanders could take part.[5]

Because land-based atomic tests were of most importance to the Army, it was decided to send three observers from the Army, and one each from the Royal New Zealand Navy and Royal New Zealand Air Force.[6] The New Zealand military authorities received additional information in August 1956 about the objectives of the operation and the tasks to be undertaken by the five officers sent to the Buffalo tests. The officers were to join the Indoctrinee Force (IF) and gain experience of the effects of nuclear explosions, especially on weapons and equipment. This experience would then be passed on to their colleagues. Before the test took place, they were to receive instruction on the purpose of the programme and how it was to be conducted. The New Zealand authorities were also informed that all the officers would be "subject to radiation hazard."[7] The Indoctrinee Force was a British Army initiative. The initial War Office paper on the subject noted that: "there are at

present practically no British Army officers who have any conception of what an atomic explosion is like, whereas the Americans have already made use of atomic tests to indoctrinate whole formations of troops. We must at least make a start in battle indoctrination with some of our future regimental and formation commanders".[8]

Five suitable officers were selected for the operation: Commander Logan Boyce Carey, RNZN, Lieutenant Colonel William Richard Kimmit (Kim) Morrison, DSO, Lieutenant Colonel John (Blackie) Burns, DSO, MBE, Major Peter Hulbert Glenn Hamilton and Flight Lieutenant Roger Hetherington Peart. Three of the officers (Carey, Hamilton and Peart) had science degrees, while Morrison, who was Director of Infantry and Training, and Burns, who was Director of Artillery, held positions at Army Headquarters that were central to the introduction of any new training programmes designed to take account of the use of atomic weapons.[9] The involvement of the New Zealand officers in the tests was approved by Thomas Macdonald, the Minister of Defence, in June 1956.[10]

The One Tree test, 27 September 1956

The five New Zealand officers arrived at Maralinga in South Australia on 28 August 1956.[11] The Indoctrinee Force received lectures from British experts on a wide range of topics related to the testing programme including blast, genetics, nuclear physics, heat effects and decontamination.[12] An important part of the test was the positioning at different distances from ground zero (the point on the ground surface at, or directly below, the initiating point of a nuclear explosion) of 'target response items': various structures, military equipment and weapons (including tanks and aircraft), dummies dressed in military uniforms and live animals. The purpose of this part of the operation was to obtain good data on the effects of atomic explosions.[13] All five observed the first test in the series, which was codenamed One Tree, at 1700 hours on 27 September 1956. The members of the Indoctrinee Force stood about 8.2 kilometres from ground zero. This test involved the detonation of a 15-kiloton atomic bomb mounted on top of a 100-foot [30 metre] tower.[14] Five minutes before the detonation the indoctrinees were instructed to face away from the tower. At the moment of detonation there was "a brilliant flash",[15] and "everything went quite white and dazzling."[16] The flash was accompanied by a heatwave which Lieutenant Colonel Burns likened to the effect "you get when you open the oven door on the Sunday Roast".[17] The officers were instructed to turn around two seconds after the detonation. They witnessed the "final stages of the fireball and subsequent development of the typical mushroom cloud".[18]

On 28 and 29 September the Indoctrinee Force was divided up into parties of 14 each led by a well briefed officer to examine the area around ground zero and in particular the blast's effect on the military equipment, weapons and other target response items. For this part of the operation the indoctrinees and the other personnel who accompanied them were dressed in full protective clothing and respirators (cotton underclothes combination, white closely-woven cotton protective suit, complete with hood, white rubber boots, respirator, white cotton gloves). The first group of indoctrinees entered the target response area around ground zero 17 hours after the detonation. Each group of indoctrinees was accompanied by a 'Health Escort' drawn from the testing organisation's radiation safety team who was equipped with a 1324 radiation dose rate survey meter and two pocket quartz-

fibre dosimeters and checked radiation levels during the tour. All members of the Indoctrinee Force carried film badges. They examined the circular area around ground zero which had become a mass of fused sand and silica and various target response items. The tours lasted about two and a half hours. The personnel were then decontaminated at a decontamination centre. "Each indoctrinee was first monitored with contamination meters for clothing contamination levels. After the check all clothing was removed and a second check made for skin contamination. This was followed by a shower and then a final check by a sensitive Geiger counter to ensure complete decontamination."[19] After the first test Commander Carey and Lieutenant Colonel Morrison returned to New Zealand.[20]

The Contaminated Clothing Trial

The Atomic Weapons Establishment report on the Indoctrinee Force states that 18 of the force's officers volunteered on 30 September to join six members of the War Office Radiac User Trials Team who were "to carry out tests on the protective value of various types of clothing for military activities in the fall-out zone".[21] The report of the Royal Commission into British Nuclear Tests in Australia also describes the men from Indoctrinee Force who took part in this trial as volunteers.[22] The New Zealand officers involved certainly did not sign any document stating that they had volunteered to take part in this trial. Given the circumstances and the general way in which such matters were handled at this time, it would have been unusual for them to have been asked to signify their agreement in writing. Lieutenant Colonel Burns remarked not long after the tests that "I was invited along with others to don respirator and protective clothing and join in the clothing trials."[23] More recently Burns has made the point that he and the other officers were representing New Zealand, and he believed that they should be represented in as full as possible range of activities during the testing operation.[24] Peart has similar views remarking that he was one of "a number of officers all of whom were representing a regiment, either British, Australian, and just we five New Zealanders and I don't remember ever being asked if we would like to go into a fallout area or anything like that. It was just part of the duty we had to carry out."[25]

The contaminated clothing trial, which took place on 30 September, investigated how much protection three types of protective clothing gave compared with standard military clothing. The details of the clothing to be worn by the men engaged in the trial and the activities they were to undertake our set out in the following extract from a memorandum to the Indoctrinee Force Commander:

> Three groups of 8 men each, wearing respectively:
>
> a. Battle dress serge (2)
>
> b. Gabardine Combat suit (2)
>
> c. Cotton Khaki drill (2)
>
> d. AWRE Combination suits (2)
>
> [In each group two men wore each sort of outfit, types A, B, C, D.]

All operate in a fall-out area on D_1+3 in the following way:

a. Group I will drive through the area seated in a one-ton vehicle.

b. Group II will drive to a certain point, debus and march through the area, embus and drive home.

c. Group III will drive to the same point, debus and proceed through the area marching, crawling and forcing a way through the undergrowth, embus and drive home.

……

Dress

Type A

Battledress, battle order, boots, anklets web, cotton gloves, towels used as kerchiefs and head covering, Service respirators.

Type B

Combat suit including hood, battle order, rubber boots and calf-length overshoes, cotton gloves and Service respirators.

Type C

Khaki drill with bush jacket worn tucked into trousers, battle order, rubber boots and calf-length overshoes, towels used as kerchiefs and head covering, Service respirators.

Type D

AWRE [Atomic Weapons Research Establishment] Combination suits with rubber boots and overshoes, cotton gloves and Service respirators.

All types will wear AWRE combination underwear.

Personnel

Six members of the War Office Radiac User Trials Team will wear Type A clothing and act as Health escorts.

Eighteen members of the Indoctrinee Force will be required to wear Types, B, C and D clothing.[26]

The two New Zealanders involved in the trial, Burns and Peart, were dressed in 'Type D' clothing.[27] Peart's comments about his involvement in this experiment strongly indicate that he was a member of Group II. It seems clear that Burns was a member of Group III as shortly after returning to New Zealand he remarked that the

group he was a member of "marched and crawled along a dirt track for about an hour occasionally being showered with dust from a vehicle which was driven past for that very purpose. I don't think we went closer than 1/2 [a] mile from GZ across the wind".[28] At the completion of the trial, the officers were decontaminated and the doses of radiation they had received were checked by monitoring staff.[29] Apparently it proved impossible "to contaminate the clothing sufficiently for the purpose of the trial".[30]

The Marcoo Test, 4 October 1956

The remaining New Zealand officers (Burns, Hamilton and Peart) were amongst the 98 Indoctrinee Force officers selected to participate in the second test of the Buffalo series.[31] The role of this group is set out in the following extract from the Atomic Weapons Establishment report on the Indoctrinee Force:

> a. Work out for themselves the likely effects of a surface burst of an assumed 4 kton yield, using known scaling laws.
>
> b. Carry out a TEWT (Tactical Exercise Without Troops) in the area around Marcoo, the aim being to assess the results of such a weapon bursting in a battalion position . . .
>
> c. Discuss, by syndicates, six tactical problems relating to the use of the 4 kton weapon . . .
>
> d. Experience some of the actual effects of the Round 2 explosion in three different environments:
>
> (i) Twenty-four officers, in four groups of 6, to be installed in field shelters with overhead cover, at a distance not nearer than one mile.
>
> (ii) Four officers to be installed in a "closed-down" armoured fighting vehicle placed on the surface at the same distance, and head-on to ground zero.
>
> (iii) The remainder, 70 officers, to stand in the open under conditions similar to those experienced at North Base on Round 1.[32]

The second test, which was code-named Marcoo, took place at 1700 hours on 4 October. It involved the detonation of a 1.5-kiloton atomic bomb at ground level to get information "about cratering and ground-shock effects".[33] According to the Royal Commission the indoctrinees witnessed the explosion from a viewing stand about 3200 yards [2926 metres] from ground zero, from a Centurion tank and a series of covered shelters located 2000 yards [1829 metres] from ground zero.[34] In his report, however, Peart states that the Centurion tank and covered shelters were about 1600 yards [1463 metres] from ground zero and that the rest of the indoctrinees observed the test from the open about 2300 yards [2103 metres] from ground zero.[35] Major Hamilton was in one of the covered shelters, while the other New Zealanders

observed the test from the open.[36] The explosion was marked by a "brilliant flash", but no fireball was visible because of "the dust cloud surrounding the explosion. Little heat was felt. A distorted mushroom cloud formed… The shockwave, as felt by the indoctrinees, was much more pronounced than in Round one and was uncomfortably intense".[37] Peart noted in his report that the indoctrinees "in the underground shelters estimated that an earth movement of approximately 1½ inches longitudinally and in the vertical plane at 1600 yards from ground zero".[38] It appears that Major Hamilton may have been near the entrance to his shelter when the detonation took place.[39] After the explosion the indoctrinees were able to observe the area around the explosion from a tower located about 1600 yards [1463 metres] from ground zero.[40]

Radiation Dosages

In December 1956, the New Zealand defence liaison staff in Melbourne passed on data that they had received about the radiation dosages received by the five New Zealand members of the Indoctrinee Force after the first Hurricane test. They noted that the "dosage was recorded by film badges. The response of the film first used was such that an accurate reading below .4r [roentgen] was not practicable. In consequence first readings are shown as 'less than .4r'. Readings for subsequent exposures are shown with greater accuracy."[41] The principal potential hazard to personnel involved in nuclear weapon tests comes "from the external irradiation of the body by gamma rays". The main way of recording exposure to gamma radiation at the Maralinga test site was for personnel to wear film badges "at all relevant times and places". The film badges used were "based on the normal package for dental x-rays but with different photographic emulsions". The film sat in a brass holder and was also able to measure exposure to beta radiation.[42] The radiation dosage information given to the New Zealand authorities is set out below:

Dosages : New Zealand Personnel Attending Buffalo Test, Maralinga 1956[43]

No.	Name	Unit	Date
-	Cdr L.B. Carey	RNZN/LO Melbourne	less than .4r
30041	Lt Col W.R.K. Morrison	AHQ Wellington New Zealand	less than .4r
30055	Lt Col J. Burns	AHQ Wellington New Zealand	less than .4r +.04r on D1+3*
30535	Maj P.H.G. Hamilton	HQ Cmd Buckle St Wellington New Zealand	Less than .4r
73501	Flt Lt R.H. Peart	RNZAF Station, Wigram, New Zealand	Less than .4r +.07r on D1+3*

* D1+3 means 30 September clothing trial – D-day means day of detonation (for more than one detonation in the same series they were designated D1-day, D2-day, etc.) See *Royal Commission*, vol. 2, Appendix A, I-2.

This data is identical to the information contained in the Atomic Weapons Establishment report AWE T1/95, 'Operation Buffalo: Personal Details for Indoctrinee Force and Support Staff''.[44] The men involved in the contaminated clothing trial received very low doses of radiation with Burns receiving .04r and Peart .07r on top of the doses they had received during their earlier tour around the site of the explosion.[45]

The New Zealand authorities were not, it seems, sent any information about the radiation doses received by our officers at the second Buffalo test. The Atomic Weapons Establishment report AWE T1/95, however, contains the following information about dosages received by the New Zealand members of the Indoctrinee Force during their service at Maralinga:

RADIOLOGICAL DETAILS FOR THE NEW ZEALAND INDOCTRINEES[46]

IF No., Rank & Name	Round 1 Activities			Round 2 Activities		Total Dose Reported (r)	Remarks on Individual Doses
	Film Badge No.	Recorded Dose (r)		Film Badge No.	Recorded Dose (r)		
		D1+1/ D1+2	D1+3				
? Lt Col Burns	90126	< .4	.04	90912	.03	< .47	-
123 Cdr Carey, LB	90123	< .4				< .4	-
127 Maj Hamilton	90127	< .4		90913	.03	< .43	-
122 Lt Col Morrison	90122	< .4				< .4	-
134 Flt Lt Peart	90134	< .4	.07	90914	.03	< .5	-

All three New Zealanders were recorded as having received a radiation dose of .03r. In a report on the test, the head of the Maralinga health physics organisation at the second test (Round 2) noted that "the dose for Round 2 [Marcoo] was negligible, but to be safe .03 (point zero three) roentgens should be added where appropriate".[47] The table below is also taken from the AWE report T1/95 and shows that only a few members of the Indoctrinee Force received close to the 3 roentgens which had been set as the maximum safe dose for the operation:[48]

INDOCTRINEE FORCE: TOTAL DOSE STATISTICS

Doses (r)	UKIF	AIF	NZIF	TOTALS
0 to < 0.1	4	16	-	20
0.1 to < 0.2	1	-	-	1
0.2 to < 0.3	-	-	-	-
0.3 to < 0.4	70	35	2	107
0.4 to < 0.5	48	10	3	61
0.5 to < 0.6	26	16	-	42
0.6 to < 0.7	15	8	-	23
0.7 to < 0.8	3	1	-	4
0.8 to < 0.9	1	-	-	1

Doses (r)	UKIF	AIF	NZIF	TOTALS
Higher Doses				
1.0 to < 1.1	1	-	-	1
1.1 to < 1.2	2	-	-	2
1.3 to < 1.4	1	-	-	1
1.4 to < 1.5	1	-	-	1
2.1 to < 2.2	1	-	-	1
2.2 to < 2.3	1	-	-	1
2.3 to < 2.4	1	-	-	1
2.6 to < 2.7	1	-	-	1
GRAND TOTALS	177	86	5	268

The Scientific Director of the National Radiation Laboratory, Dr Andrew McEwan, has noted that "the T1/95 report indicates that the accumulated doses received by the five New Zealanders were all '< 0.5r'. The 'r' stands for 'roentgen' and is approximately equivalent to 10 millisieverts (mSv) in modern units hence '0.5r' implies 5mSv". An accumulated dose of this size is "within the range of common annual exposure from natural background radiation in different countries around the world".[49]

An Unofficial Observer at the Breakaway Test, 21 October 1956

In October 1956 arrangements were made with the Royal Air Force by the New Zealand Joint Services Liaison Staff in Melbourne for an RNZAF representative to observe the fourth and final test in the Buffalo series, which was codenamed Breakaway. The officer selected for this task, Wing Commander Ivan Reid Mitchell, DFC, was an unofficial observer at the test, and this is probably the reason why his attendance at the test has not been generally known.[50] The test took place just after midnight very early on 22 October. The weapon being tested was detonated at the top of a 100 [30 metre] foot tower and had an estimated yield of less than 16 kilotons.[51] Mitchell and the other observers were at an observation point on a slight rise about six miles (9.65 km) from the test weapon. They stood with their backs to the blast with their eyes closed. Three seconds after the explosion they were allowed to turn around.[52] Mitchell reported that:

> On facing of the firing area, the glowing fireball could be observed extending up to and apparently through the cloud base. Sufficient light was still either being directly emitted from the fireball or refracted from the cloud to illuminate the country side [sic]. Trees and buildings stood out in sharp relief. The fireball appeared to surge and heave and after an indeterminate time, which may have lasted 10/20 seconds, it died away. The incipient stem of the mushroom cloud could be clearly seen but the low cloud precluded observation of the mushroom phenomenon.[53]

About 30 minutes after the explosion, Mitchell was allowed to enter the forward area around the ground zero in the company of a British scientist, E.R. Drake Seager. Before entering this area, they stopped at a health control post and were issued with a dosemeter. They traveled round the forward area in a Land Rover for almost an hour in a zone 1500 yards [1372 metres] to 700 yards [640 metres] from ground zero. When they left the forward area, the total dose of radiation recorded on the dosemeter was 1.1 roentgen.[54]

New Zealand Observers at Maralinga, 1957

In August 1957 New Zealand was invited by the British Government, with the agreement of the Australian Government, to send two observers to one of the explosions in the atomic weapon test series codenamed Antler. The tests were scheduled to begin the following month at Maralinga.[55] The Chiefs of Staff decided to send only one officer from New Zealand, Captain Graeme Stewart McNaughton, a member of the New Zealand Defence Scientific Corps. McNaughton had a doctorate in radiation chemistry from Leeds University and was attached to the Nuclear Sciences Division of the Department of Scientific and Industrial Research (DSIR). As part of his work with the DSIR, McNaughton had been involved in establishing a network of radioactive fallout stations in New Zealand and the Pacific islands. The DSIR believed that McNaughton would be able to pick up much useful information through discussions with officials at Maralinga. This information they considered would be "of extreme value in our own evaluation of the radiation hazards to our Island Dependencies from the Pacific A Bomb Testing Programme". The other New Zealand observer was a member of the New Zealand liaison staff in Melbourne, Lieutenant Colonel Dennis Alfred Caughley.[56] The approval of the Minister of Defence was, it seems, obtained shortly after the decision to send the observers was made.[57]

The two New Zealand officers were part of a very large group of observers, which included military personnel and scientists from a wide range of countries with which Britain had defence ties including Norway, France, Italy, Iraq, Turkey and Pakistan.[58] The observer group were flown from Adelaide to Maralinga to witness the second test (codenamed Biak) in the series, which was at 1000 hours on 25 September 1957. They witnessed the detonation of an approximately six kiloton device, which had been placed at the top of a 100 foot [30 metre] tower. The observer group were stationed about nine miles [14.5 kilometres] from ground zero. They stood with their backs to the blast and had their eyes closed. McNaughton reported that "the light flash was distinctly visible through closed eyelids. At the same time the heat wave was felt like a hot wind on the back of the neck for about a second…. The noise of the explosion arrived after 37 seconds but the blast was not felt". About three or four seconds after the explosion, the observers were allowed to turn around and face the blast. "The rapidly cooling fireball could be distinguished though largely shrouded by the cloud of radioactive bomb debris which was beginning to condense. The subsequent cloud development was typical of a low air burst."[59] After the test, McNaughton briefly visited the "forward test area" which was closer to ground zero and the sites of earlier tests.[60]

The information gathered by the New Zealand personnel who took part in the British nuclear weapon tests in Australia was passed on to their colleagues in the New Zealand Armed Forces through reports, presentations and participation in seminars.[61]

Other New Zealanders at Maralinga

A number of other New Zealand military personnel visited Maralinga at some time between 1955 and 1966 as they are listed as receiving one of the identity cards required for all personnel visiting or employed at the Maralinga test site. The identity cards material is in the form of a card index now held by the National Archives of Australia in Canberra.[62] Some people who were security cleared, but who did not actually visit the test site are included in the card index. A total of 17 New Zealand military personnel are listed in this card series. They include the five New Zealand members of the Indoctrinee Force and Captain McNaughton, but the cards do not list Lieutenant Colonel Caughley or Wing Commander Mitchell. This might be because Caughley and Mitchell were members of the New Zealand liaison staff in Melbourne and may therefore have had the correct kind of identity card before visiting Maralinga. Of the remaining cards eight are for men who passed through Maralinga on 2 September 1957, 12 days before the first test in the Antler series on 14 September. The names of the men in this group are set out below:

Leading Aircraftsman (LAC) Francis Wilfred De Malmanche, No. 76041, RNZAF
Sergeant William James Raymond Gray, No. 75945, RNZAF
Flying Officer (pilot) John L'Eef, No. 709786, RNZAF
LAC Noel Francis Lynch, RNZAF, No. 922390, RNZAF
LAC Bruce Dalton Macken, No. 77226, RNZAF
LAC John Robert Redman, No. 77568, RNZAF
Flying Officer (Navigator) Frederick Edgar Arthur Rowe, No. 77533, RNZAF
LAC Stuart Adrian Walters, No. 897584, RNZAF.[63]

In September 1957 all this group were serving with No. 41 Squadron RNZAF, a transport unit operating Bristol Freighters, which was based in Singapore. No. 41 Squadron operated over a very wide area. On 2 September a Bristol Freighter, NZ 5909, captained by Flying Officer L'Eef had a stopover at Maralinga. During the day it flew supplies from Maralinga to Mount Clarence and return. The flight time was 3 hours 37 minutes. Mount Clarence was a monitoring station for the Maralinga testing area. The personnel on board consisted of a flight crew of three (L'Eef, Rowe and Gray) and a five-strong maintenance team (De Malmanche, Lynch, Macken, Redman and Walters).[64]

Three other New Zealand officers are listed in the card series. They are:

Squadron Leader Peter Brotherhood Andrews, RNZAF
Squadron Leader R (Roger Patrick) Drayton, RNZAF
Group Captain William Hector Stratton, RNZAF[65]

Squadron Leader Andrews, an RNZAF education officer, was at a Royal Australian Air Force Staff College course between January and December 1958.[66] On the card dealing with Andrews there is a reference to an RAAF memorandum dated

17 August 1958 and it therefore appears most probable that Andrews's visit to Maralinga was part of his staff college course.[67] There were no nuclear weapon tests at Maralinga after 1957, but between April and November 1958 a series of 'minor trials' were conducted at Maralinga. The minor trials consisted of experiments connected with the British nuclear weapons programme, which did not involve nuclear detonations, but did on occasion result in the release of radiation.[68] The minor trials programme at Maralinga continued until 1963.[69] Andrews, who was born on 30 March 1926, retired from the RNZAF in March 1966 and as far as we are aware is still alive.[70]

Squadron Leader Roger Patrick Drayton was in March 1965 sent on an exchange posting with the RAAF for two years. He held the position of S14 with Support Command RAAF. It was the intention that he would "gain experience in the assessment and provisioning of radio equipment" during this appointment.[71] On the Maralinga identity card for Drayton there is a reference to an RAAF list dated 16 March 1966. It would seem probable from this that he may have visited Maralinga in 1966 as part of his duties with the RAAF.[72] Drayton, who was born on 4 January 1925, retired from the RNZAF in 1969 and died at Paraparumu on 21 June 1986.[73]

Group Captain (later Air-Vice Marshal) William Hector Stratton, DFC and Bar, mid, took up the position of Head of New Zealand Joint Services Liaison Staff in Melbourne on 1 September 1956 and held that position until February 1960.[74] On Stratton's Maralinga identity card there is reference to an RAAF paper dated 25 June 1958. This strongly suggests that Stratton may have visited Maralinga in the course of his duties as Head of the New Zealand Defence Joint Services Liaison Staff.[75] After completing his service as Chief of Air Staff in 1971, Air-Vice Marshal Stratton, who was born on 22 July 1916, retired to Australia and as far as we are aware is still alive.[76]

Included in the *Report of the Royal Commission into British Nuclear Tests in Australia*, witness and statement list is the name C.P. Weaver, Royal New Zealand Navy.[77] This person would appear to be Able Seaman Colin Peter Weaver, NZ15133 who was serving in the RNZN at the time of both the British nuclear weapon tests in Australia and in the central Pacific. He was posted to HMNZS *Rotoiti* from 12 August 1957 to 2 August 1959 and so was presumably on board when the *Rotoiti* participated in the nuclear weapon test Grapple X at Christmas Island on 8 November 1957. At the time of the earlier tests in Australia he was serving on the frigate HMNZS *Pukaki* or HMNZS *Philomel* in Auckland.[78] It appears likely, therefore, that his evidence to the Australian Royal Commission related to the Grapple tests rather than indicating that he was involved in the earlier tests in Australia.

<u>New Zealand Observers at Operation Grapple, May 1957</u>

In addition to the observers sent to the atomic tests in Australia, New Zealand sent observers to other tests in the United States and the Pacific. Early in 1957 the British Government invited New Zealand to send one observer to the first test by United Kingdom of a thermonuclear device.[79] The New Zealand Chiefs of Staff considered that, given substantial assistance the New Zealand Armed Forces were

giving the British thermonuclear weapon testing programme, that should be allowed to send three observers to the test.[80] The Minister of Defence endorsed this position and when approached the British agreed to three observers attending the test.[81] The three observers selected to attend the test were Commander Logan Boyce Carey, RNZN, Major David John Aitken and Mr H.J. Yeabsley, the Deputy Director of the Health Department's Dominion X-Ray and Radium Laboratory (now the National Radiation Laboratory).[82]

Along with observers from other countries, the three New Zealanders observed the first British thermonuclear test on 15 May 1957 from HMS *Alert*. The Royal Navy ship was positioned about 30 miles [48 kilometres] from Malden Island, in the central Pacific, when the bomb, which was dropped from a British aircraft, exploded high above the Island. Available information about the size of the detonation is limited, but it appears that it was less than one megaton, perhaps about half a megaton. The observers had been issued with "white anti-flash suits, hoods, and gloves and with dark goggles." They sat on the deck of the ship facing away from the blast. Ten seconds after the explosion they were allowed to turn around. Yeabsley noted that "at that time the fire-ball was less bright than the sun and could be viewed with the unshielded eye. I estimated its diameter to be about 1½ miles [2.4 kilometres] and the distance from its lowest point to the sea to be at least three miles (15,000 feet) [4572 metres]". After the test Yeabsley held discussions with members of the British scientific team who told him that the radioactive cloud produced by the detonation had travelled up into the stratosphere and that they expected little, if any, pollution on nearly islands. The New Zealand scientist was impressed by the way the tests were being conducted, and concluded in his report that the tests "were being made in such a fashion that the possibility of highly active local fall-out was reduced to a minimum and that no person under the care of the New Zealand Government was liable to suffer radiation damage from the operation".[83] Yeabsley's views about the safety of the test was supported by British scientific reports sent to the New Zealand Government.[84]

The Smoky Test, Nevada, 1 September 1957

In May 1957 the United States Army invited Air Commodore T.F. (Frank) Gill, the New Zealand defence attaché in Washington and another New Zealand officer to attend a nuclear weapon test to be held at the Nevada test site. The Chiefs of Staff Committee decided that the cost of sending an officer from New Zealand to attend this test was too great and that Air Commodore Gill and perhaps his deputy should attend.[85]

In the event only Gill's deputy, Lieutenant Colonel John Alexander Pountney, attended the 15th test in the American test series codenamed Operation Plumb Bob. The test he observed on 1 September 1957 was codenamed 'Smoky'. Pountney was one of 80 observers from a range of NATO countries and other nations with defence links with the United States. They observed the detonation of an approximately 44 kiloton nuclear bomb mounted on a 700 foot steel tower at 0530 hours (a few minutes before dawn) from a hill about 16 miles [26 kilometres] away from the tower (ground zero). The observers "were issued with dark glasses, through which an electric light globe at 20 yards was just visible". Pountney reported that the "detonation followed the familiar pattern of fireball-smoke-mushroom, and

the countryside for a radius of many miles was as bright as in clear daylight. Simultaneously with the detonation, a scrub-covered hillside some 2 miles [3.2 kilometres] from the tower burst into flame. As the mushroom cloud formed, it was surrounded by an aura of vivid blue lasting about one minute, and this was seen clearly from a distance of over 400 miles."[86]

The test was an "Army participation shot" and about 700 American and Canadian troops were dug into positions about 8500 yards [7772 metres] from ground zero. "Immediately after the blast, and as soon as the fallout path had been determined and the radiation monitors had given clearance, the force was lifted by helicopters and taken to pre-designated assault positions, for an attack against deep objectives".[87]

The Pisonia Test, Eniwetok Atoll, 18 July 1958

In June 1958 the United States Army Attaché in Wellington, on behalf of the American Secretary of Defence, invited the Minister of Defence, Phillip Connolly, to send a member of the New Zealand Armed Forces to witness a nuclear test at the Eniwetok proving ground, in the Marshall Islands the following month.[88] The invitation was accepted by Connolly, after consultation, it appears, with the Prime Minister Walter Nash and the Chiefs of Staff who noted that:

> The study of warfare under nuclear conditions is undertaken by all three Services. The study, however, is of necessity theoretical, as the opportunity for New Zealand officers to witness nuclear explosions and to study their effects at first-hand occurs very infrequently. Such an opportunity would therefore be of considerable benefit not only to the individual concerned, but also to all three Services to whom he could pass on his first-hand experience.[89]

The officer selected to observe the American test was Wing Commander Ivan Reid Mitchell who had been present at one of the British tests at Maralinga in 1956. Mitchell and a group of the observers from Taiwan, South Korea, Thailand, Spain, Philippines and Iran arrived at Eniwetok at 0800 hours on 18 July 1958. Three hours later they witnessed the detonation of an estimated 250 kiloton nuclear weapon. The weapon had been placed on a barge in the atoll's lagoon about eight and a half miles [13.5 kilometres] from the observers' position on Jap Tan Island. The observers, who were accompanied by a United States Air Force General, were issued with very dark goggles, which "enabled the wearer to observe every detail of the test."[90] In his report on his visit Mitchell included a very detailed account of the test:

> At zero hour the device was detonated. The fireball was immediately apparent and it rapidly grew until it reached a semi-diameter of about 900ft [274 metres]. Even with the high density goggles the brilliance of the light emitted from the fireball was apparent. A "Wilson" cloud effect was seen to form and envelop the fireball as it rose. This cloud did not, however, appear to persist for more than 10/15 seconds. Without the aid of a movie camera and synchronised timing devices it is impossible to give an accurate chronological statement of the sequences of the

phenomena observed. The following is, however, an approximate statement of the sequences:

M - Fireball visible on horizon, growing rapidly – intense bright light.

M + 1 sec. - Fireball reached maximum semi-diameter of about 900 ft and commenced to rise.

- Intense blast of heat felt on exposed parts of the body. Stated by Dr Ogle to be about 1 cal./sq.cm. The heat or thermal effect was much more pronounced than that experienced at Maralinga for the low airburst shot of a 20 kt bomb.

M + 2 sec. - Heavy earth tremors experienced which appeared to follow a sine wave pattern, giving the impression of seven distinct shocks which lasted for 8-10 seconds. Light emission still intense. "Wilson" cloud effect visible around fireball.

M + 3 sec. - (High Density goggles raised). Fireball rising rapidly and glowing intensely. Hugh column of water noted at ground zero extending upwards. Shock front, distinguished as a dark circle, moving outwards at a great speed.

M + 5 sec. - Fireball continues to rise, light still bright but more diffused. Column of water and stem of "mushroom" difficult to separate. Dark ring on surface extending outwards from ground zero. Thought to be wave.

M + 15 sec. - Fireball dead. Cloud rising rapidly, boiling and swelling. Stem of mushroom now well defined.

M + 30 sec. - Experienced blast from shock wave. Very heavy, sufficient to knock a man down if standing upright. Coconut palms bent before impact. Negative pressure wave not detected, but probably due to psychological effect arising from unexpected severity of shock front. Slightly later the sound accompanying the explosion was heard. The intensity of the sound was high but of comparatively short duration.

M + 8 mins. - Negative water wave surge reached short of Jap Tan Island. For some minutes it had been possible to watch the water surge on adjacent atolls closer to GZ. The negative surge was followed by a positive surge and this sequence was prolonged for 15/30 minutes. At its greatest intensity it is estimated the water rose and fell 10 feet.

M + 10 mins. - Heavy rain fell from clouds in the area. A well defined water spout developed in the GZ zone and persisted for about 30 minutes. The atomic cloud which had been obscured by cloud build-up was now clearly seen through cloud breaks. Initially it appeared to be moving westwards and at one stage seemed to be almost overhead. Subsequently it drifted to the East. The purplish hue of the cloud caused by iodine impregnation was a notable characteristic.

M + 20 mins. - Group embarked for return journey to Parry Island.[91]

Mitchell noted that the test was in effect an underwater explosion and that this type of test produced a significant amount of radioactive fallout.[92] He also noted that the very limited amount of information provided by the American authorities meant that the participation of a New Zealand observer was of very little value to the New Zealand Armed Forces.[93] This point was taken up by the Chiefs of Staff Committee who agreed that in the event of New Zealand receiving a similar invitation in the future that they would propose to ask the United States authorities for "more detailed background information."[94]

Mitchell was it seems the last of the group official New Zealand military observers to attend atmospheric nuclear weapon tests. The only information held by the New Zealand Defence Force on the radiation doses received by this group of personnel relates to the members of the Indoctrinee Force and Wing Commander Mitchell's presence at the Breakaway test in 1956. Appendix 1 summarises the activities of the New Zealand observers and indoctrinees at nuclear weapon tests conducted between 1956 and 1958.

JOHN CRAWFORD
Deputy Director History
Headquarters New Zealand Defence Force

6 June 2001

APPENDIX I

NEW ZEALAND OBSERVERS AND INDOCTRINEES AT NUCLEAR WEAPON TESTS 1956-58

Name and Rank	Tests	Date	Location	Radiation Dose (if known)	Date of Birth	Alive/Dead [1]
Aitken, D.J., Maj	Grapple	15/5/57	Malden Island	–	11/10/17	?
Burns, J., Lt Col [2]	One Tree Marcoo	27/9/56 4/10/56	Maralinga Maralinga	Less than .4r + 0.4r on D1+3 .03r	30/11/17	Alive
Carey, L.B., Cdr	One Tree Grapple	27/9/56 15/5/57	Maralinga Malden Island	Less than .4r –	29/9/15	10/7/70
Caughley, D.A., Lt Col	Biak	25/9/57	Maralinga	–	7/8/12	8/6/72
Hamilton, P.H.G., Maj	One Tree Marcoo	27/9/56 4/10/56	Maralinga Maralinga	Less than .4r .03r	26/4/18	13/12/99
McNaughton, G.S. Capt	Biak	25/9/57	Maralinga	–	4/8/29	Alive
Mitchell, I.R., Wg Cdr	Breakaway Pisonia	21/10/56 18/7/58	Maralinga Eniwetok Atoll	1.1r –	23/6/16	Alive
Morrison, W.K.M., Lt Col	One Tree	27/9/56	Maralinga	Less than .4r	23/1/14	Alive
Peart, R.H., Flt Lt [2]	One Tree Marcoo	27/9/56 4/10/56	Maralinga Maralinga	Less than .4r + 0.7r on D1+3 .03r	25/7/22	Alive
Pountney, J.A., Lt Col	Smoky	1/9/57	Nevada	–	17/2/15	8/1/83
Yeabsley, H.J., Mr	Grapple	15/5/57	Malden Island	–	11/11/16	17/1/98

Notes:

1 Date of death noted if known.
2 Took part in clothing trial at Maralinga, 30 September 1956.

[1] Owen Wilkes, 'New Zealand and the Atom Bomb during and after the Second World War', unpublished paper in author's possession; J.A.B. Crawford, 'The Involvement of the Royal New Zealand Navy in the British Nuclear Testing Programmes of 1957 and 1958', Headquarters New Zealand Defence Force, Wellington, 1989, p. 1-2.

2 Gill to Commanding Officer RNZAF Station Lauthala Bay, 5 August 1955, Air 39/3/14, HQ NZDF. The RNZAF later took over the task at Ohakea. See McDowell to Air Department, 5 December 1958, minute MET 42/1/4, 30 December 1958, Air 39/3/14.

3 Stanners to Chief of the General Staff, 6 January 1956, JSO 8/7/2, HQ NZDF.

4 Minutes of the Chiefs of Staff Committee meeting held on 10 January 1956, JSO 8/7/2.

5 Wilson to Stanners, 6 February 1956, JSO 8/7/2.

6 Minutes of the Chiefs of Staff Committee Meeting held on 17 February 1956, JSO 8/7/2.

7 Signal JOZMEB to JOZWEL, number S 342, 5 August 1956, JSO 8/7/2.

8 E.R. Drake Seager, Atomic Weapons Establishment Report T1/93, 'Operation Buffalo: The Indoctrination of Serving Officers', p. 5.

9 Information compiled from the personal files of Carey, Hamilton, Morrison, Burns and Peart, HQ NZDF.

10 Signal JOZWEL to JOZLOND, 22 February 1956, Army Secretary to Minister of Defence, 19 June 1956, JSO 8/7/2.

11 R.H. Peart, 'Report on Exercise Buffalo, Trials Maralinga, Australia', 24 October 1956, Appendix A, Air 222/2/1.

12 *The Report of the Royal Commission into British Nuclear Tests in Australia*, Canberra, 1985, vol. 1, pp. 336-37; Lorna Arnold, *A Very Special Relationship: British Atomic Weapon Trials in Australia*, London, 1987, pp. 152-53.

13 Peart report, pp. 3-4; Arnold, pp. 155-59; E.R. Drake Seager, 'Operation Buffalo: the Indoctrination of Serving Officers', AWE Report T1/93, pp. 124-25.

14 *Royal Commission*, vol. 1, pp. 277, 337; Peart Report, p. 4; Arnold, p. 287.

15 Peart report, p. 4.

16 Notes on a talk given by Lieutenant-Colonel Burns after his return to New Zealand, held by Brigadier John Burns.

17 Ibid.

18 Peart report, p. 4.

19 Peart report, pp. 8, 4-6, 9; AWE T1/93, pp. 21-23, 123, 126; *Royal Commission*, vol 1., pp. 337-38, Peart interview; Burns interview.

20 Peart report, p. 1.

21 AWE T1/93, p. 23.

22 *Royal Commission*, vol. 1, pp. 338.

23 Burns' notes, pp. 2-3.

24 Telephone interview with Brigadier John Burns, 30 May 2001.

25 Telephone interview with Wing Commander Roger Peart, 30 May 2001.

26 AWE T1/93, Appendix M, Annex 1.

27 Burns' notes, p 3, Burns interview, Peart interview, *New Zealand Herald*, 15 May 2001, p. 1.

28 Burns' notes, p. 3; Burns interview; Draft interview; *New Zealand Herald*, 15 May 2001, p. 1.

29 AWE T1/93, p. 84; Burns' notes, p. 3.

30 *Royal Commission*, vol. 1, p. 338.

31 AWE T1/93, p. 24.

32 Ibid., pp. 24-25.

33 Arnold, pp. 162, 287; Peart report, page 10; *Royal Commission*, vol. 1, p. 338. Note: Arnold states that the detonation took place at 1630 hours, but both of the Royal Commission and Peart state that it took place at 1700 hours.

34 *Royal Commission*, vol. 1, p. 338.

35 Peart report, p. 10.

36 *Royal Commission*, vol. 1, P. 338, Peart interview, Burns interview.

37 Peart report, pp. 10-11.

38 Peart report, p. 11.

39 Peart interview.

40 Peart report, p. 11.

41 New Zealand Joint Services Liaison Staff to Secretary Chiefs of Staff Committee, 4 December 1956, JSO 8/7/2. Note: Roentgen: The old unit exposure to x-rays or gamma radiation. It is defined as the quantity of radiation that will produce 2.58 x 10-4 coulombs per kilogram of dry air. An exposure of 1 roentgen is roughly equivalent to an absorbed dose of 1 rad, or 0.01 gray, in soft tissue.

42 E.R. Drake Seager, Atomic Weapons Establishment Report T1/95, 'Operation Buffalo: Personal Details for Indoctrinee Force and Support Staff', pp. 6-7.

43 Enclosure to New Zealand Joint Services Liaison Staff to Secretary Chiefs of Staff Committee, 4 December 1956, JSO 8/7/2.

44 AWE Report T1/95, pp. 27-28.

45 Ibid.

46 AWE T1/95, pp. 62-70.

47 As quoted in AWE T1/95, p. 9.

48 AWE T1/95, p. 10.

49 McEwan to Crawford, 14 May 2001, NZDF 3320/4/2.

50 Wing Commander Ivan Mitchell, 'Report on Staff Visit to RAAF Edinburgh and Maralinga', 14 December 1956, p. 1, HQ NZDF.

51 Arnold, p. 164, *Royal Commission*, vol. 1, p. 287.

52 Mitchell, p. 22.

53 Ibid.

54 Mitchell, p. 23; telephone interview with Group Captain I.R. Mitchell, 30 May 2001; Arnold, p. 155.

55 Stanners to Chiefs of Staff, 21 August 1957, AIR 222/2/1; Arnold, pp. 177-78.

56 Rafter to Secretary-Executive Officer, Defence Research Organisation, 4 September 1957, Army General Staff to Secretary Chiefs of Staff Committee, 21 August 1957, Minutes of Meeting of the Chiefs of Staff Committee held on 29 August 1957, Eastgate to Secretary of Chiefs of Staff Committee, 6 September 1957 and enclosures, signal JOZWEL to JOZMEB, No 156, 5 September 1957, AIR 222/2/1; memorandum to Cleary, September 1957, JSO 8/7/2.

57 The Chief of the General Staff was asked to seek permission from the Minister on 29 August 1957, but because the relevant Army file has it appears been destroyed I have not been able to locate a paper from the Minister of Defence approving the dispatch of the two observers. See the Minutes of Meeting of the Chiefs of Staff Committee held 29 August 1957, AIR 222/2/1.

58 McNaughton 'Report on a Visit to Maralinga, September 1957', Air 222/2/1; Arnold, p. 184.

59 McNaughton, 'Maralinga', p. 2. McNaughton also prepared a more comprehensive technical paper, 'Report on a Visit to Australia for Operation Antler September 1957', Air 222/2/1; *Royal Commission*, vol. 1, pp. 350, 356-57; Arnold, pp. 188-89, 287.

60 McNaughton, 'Operation Antler', pp. 3-4, Air 222/2/1.

61 See for example Burns interview; minute by Director of Artillery, 7 August 1958, McNaughton personal file (PF), HQ NZDF Captain G.S. McNaughton, 'Radiation Survey Meter No. 2', NA 06/1/33, HQ NZDF.

62 National Archives of Australia reference series A6242, identification cards of persons employed at Maralinga (SA) atomic test site.

63 Copies of New Zealand cards from series A6242, enclosure to Layland to New Zealand High Commissioner Canberra, 20 January 1983, Defence D12/1/1, HQ NZDF; National Archives of Australia Fact Sheet 129, 'British Nuclear Test at Maralinga', copy in author's possession; Arnold, p. 287.

64 Report of the Air Department for the year ending 31 March 1958, H37, p. 4; information compiled by Personnel Branch HQNZDF staff, May 2001, notes on conversation with Mr W.R.S. Gray, 31 May 2001 and information provided by Mr Gray.

65 Copies of cards enclosed with Layland to High Commissioner 20 January 1983, D12/1/1.

66 'Outline of Peter Brotherhood Andrews, BA Career', above RNZAF Station Whenuapai to Air Department, Wellington, 24 April 1961, Peter Brotherhood Andrews PF, HQ NZDF.

67 Andrews card, enclosure to Layland to High Commission Canberra, 20 January 1983.

68 *Royal Commission*, vol. 2, pp. 505-26; Arnold, pp. 199-204.

69 *Royal Commission*, vol. 2, pp. 523-24; Arnold, pp. 217-18.

70 Extract from *New Zealand Gazette*, 17 March 1966, No. 15, p. 373, confidential report, for 1953-54, Andrews personal file; information provided by Office of Veterans' Affairs.

71 Application for financial authority dated 21 January 1965, 'Career Brief' Squadron Leader Drayton personnel file, HQ NZDF.

72 Drayton card, enclosure to Layland to High Commissioner, 20 January 1983, Defence 12/1/1.

73 Ibid career brief, notification of death Department of Internal Affairs dated 11 October 1986.

74 Service career of Group Captain Stratton, 12 August 1957 and 'Career Brief' Air Commodore W.H. Stratton, Stratton PF, HQ NZDF.

75 Stratton card enclosure to Layland to High Commissioner, 20 January 1983, D12/1/1.

76 Career brief Air Commodore W.H. Stratton, clipping from *Christchurch Star*, 13 April 1971, Government Superannuation Fund form - Retirement or Death of Contributor, Stratton PF.

77 *Royal Commission*, vol. 2, IV-6.

78 Copy of posting card attached to McNamara to Pearce, 19 December 1996, Colin Peter Weaver personal file, HQ NZDF.

79 Cleary to Secretary of External Affairs, 23 January 1957, JSO 8/7/2.

80 Minutes of Meeting of the Chiefs of Staff Committee held 29 January 1957, JSO 8/7/2.

81 McBeath to Minister of Defence, 30 January 1957, note to Stanners, 4 February 1957, Stanners to Chiefs of Staff, 1 March 1957, JSO 8/7/2.

82 Laking to Cleary, 4 April 1957, Kennedy to Chiefs of Staff, 29 April 1957 and enclosure, Cabinet Minute (57) 17, 7 May 1957, JSO 8/7/2; Crawford, RNZN, p. 33.

83 H.J. Yeabsley, 'Confidential Report on the Observation of the British H-Bomb Test in the Pacific on 15th May 1957', nd, but probably June 1957, PM 121/5/2, Archives New Zealand Wellington. It is unclear from the report whether Yeabsley is referring to ordinary or nautical miles. If he was 30 nautical miles from ground zero, that would equate to 55.5 kilometres.

84 Crawford, RNZN, pp. 34-35, 38; Denis Blakeway and Sue Lloyd Roberts, *Fields of Thunder : Testing Britain's Bomb*, London, 1985, p. 158.

85 Schow to Gill, 9 May 1957, Stanners to Chiefs of Staff, 30 May 1957, Minutes of Meeting of the Chiefs of Staff Committee held 11 June 1957, JOZWEL to NZJSM Washington, No 104, 18 June 1957, JSO 8/7/2.

86 [J.A. Pountney], 'Observation of Atomic Test Shot "Smoky", 1 September 1957', Enclosure to Gill to Secretary Chiefs of Staff Committee, 10 September 1957, JSO 8/7/2; 'US Atmospheric Nuclear Tests Database', http://www.2vis.com/usnuks.shtml.

87 Observation of "Smoky", 1 September 1957, JSO 8/7/2.

88 Lanterman to Connolly, 30 June 1958, Air 222/2/1.

89 Chief of the General Staff to Minister of Defence, 2 July 1958, Stevens to Minister of Defence, 14 July 1958 and marginalia by Connolly, Air 222/2/1.

90 Wing Commander Ivan Mitchell, 'Report on Visit to Eniwetok Atomic Proving Ground', 29 July 1958, Air 222/2/1, 'US Atmospheric Nuclear Tests Database', http://www.2vis.com/usnuks.shtm1.

91 Mitchell, 'Visit to Eniwetok', pp.10-11.

92 Ibid., p. 9.

93 Ibid., pp. 11-12.

94 Secretary Chiefs of Staff Committee to Minister of Defence, 14 August 1958, JSO 8/7/2.