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ARMY OPERATIONAL RESEARCH GROUP

REPORT No. 9/57

THE VALUE OF LIVE INDOCTRINATION
AT A NUCLEAR WEAPON TRIAL
(OPERATION BUFFALO)



NOVEMBER 1957

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ARMY OPERATIONAL RESEARCH GROUP

REPORT NO. 9/57

THE VALUE OF LIVE INDOCTRINATION
AT A NUCLEAR WEAPON TRIAL
(OPERATION BUFFALO)

Study No. 362
Requested by DGMT
86/Research/1120

Report prepared by:

[REDACTED]

Approved by:

[REDACTED]

Chief Superintendent, AORG.

ARMY OPERATIONAL RESEARCH GROUP

REPORT NO. 9/57

THE VALUE OF LIVE INDOCTRINATION AT A NUCLEAR WEAPON TRIAL
(OPERATION BUFFALO)

Prepared by: [REDACTED]

ABSTRACT

1. About 250 officers (British, Australian and New Zealanders) attended the first of the nuclear weapon tests at Maralinga in September 1956. The object of their "indoctrination" was to give them a better idea of the nature and possibilities of nuclear warfare than could be inculcated by lectures and "cold" or faked demonstrations alone. Also, they could pass on their experience to other members of the Armed Forces at the conclusion of the trial.
2. In order to ascertain whether any measurable change had occurred in the attitudes of the Indoctrinees towards nuclear weapons as a result of their experiences, it was suggested to AORG that pre-bomb and post-bomb questionnaires should be produced by them and administered with this end in view. In the event, however, the Indoctrinees, between arriving at the camp and completing their post-bomb questionnaires, had had an intensive course of scientific lectures on the subject of nuclear warfare and had assisted in preparing the range; so that any changes in their knowledge, opinions and attitudes cannot necessarily be ascribed to the witnessing of the explosion itself or to the examination of the target response area.
3. Analysis of control group, pre-bomb and post-bomb questionnaires indicates a definite increase in knowledge by the indoctrinees after the explosion. They also appeared to be more ready to accept a nuclear missile as a tactical weapon after the explosion than before, and the indoctrinees before the explosion were more ready to accept one than were the control group.
4. In general, the indoctrinees were very impressed by the flash and heat-wave of the nuclear explosion, but disappointed in the noise and the blast (at $5\frac{3}{4}$ miles), which were refracted by ground winds over their heads.
5. Nearly all the indoctrinees either stated directly or implied that they had gained something from their experience that they could not have got from films and faked demonstrations. About half of them stated that they would now be able to lecture and train more convincingly, with more authority, on the subject.
6. Of those indoctrinees who examined the target area before filling in their post-bomb questionnaires, nearly one-half stated that this procedure was far more important than actually witnessing the explosion.
7. It is recommended that:-
 - (i) if it is desired to assess the probable morale and shock effects of a nuclear explosion, formed units should be used in a realistic exercise; and

- [REDACTED]
- (ii) the possibility of producing a split-second heat radiator should be examined; and the use thereof, together with "target" areas containing undamaged and damaged military equipment and a cinema demonstration (as detailed in the report), as giving the best possible facsimile of a live indoctrination, should be considered.

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Prepared by: [REDACTED]

INTRODUCTION

History of the Study

1. On 15 December, 1955, the Chiefs of Staff approved a War Office proposal that 250 members of the Services should attend the BUFFALO trials at Maralinga for "indoctrination" in the effects of nuclear weapons. They should witness the explosion of the first bomb only, and the object of their indoctrination was to give them a better idea of the nature and possibilities of nuclear weapons and effects than could be inculcated by lectures and "cold" or faked demonstrations alone. Also, they could pass on their experience to other members of the Armed Forces at the conclusion of the trial.

2. In February, 1956, it was suggested to AORG by GS(W)7 (Plans) (now GS(W)11) that we should produce some questionnaires to be administered to these Indoctrinees, in order to ascertain whether any measurable change had occurred in their attitudes towards nuclear weapons as a result of their experiences. Two vacancies in the Indoctrinee Force were accordingly allotted by MT11 to AORG for this purpose; and the author and [REDACTED] of Science 1 were nominated to fill them.

3. The original intention was that the indoctrinees, after two days of lectures in either London or Singapore, should be flown to Maralinga, within four days of arrival have a talk on the programme and the geography of the place, and then tour the target area. They should then await the explosion, which should occur any time within the next ten days, after which they should tour the target area again. The intended procedure may be summarized as follows:

- Stage A. Preliminary Lectures (London or Singapore)
- Stage B. Journey to Maralinga
- Stage C. Briefing at Maralinga
- Stage D. First Tour of Target Area
- Stage E. Witnessing of Explosion
- Stage F. Second Tour of Target Area
- Stage G. Return to Duty Stations.

At Appendix A is Indoctrinee Force Instruction No. 1, which gives an idea of the intentions at that date (16 July, '56).

4. On this basis, it was decided to produce three similar (though not necessarily identical) questionnaires, according to the plan below:

- No. 1 to ascertain knowledge about, opinions on, and attitudes towards nuclear warfare before Stage A, to be administered not only to the indoctrinees but also to a control group matched as far as possible (by rank and arm) with the Indoctrinee Force (the "IF").
- No. 2 to ascertain post-lecture but pre-explosion knowledge, opinions and attitudes; to be administered between Stages D and E whilst waiting for the explosion.
- No. 3 to ascertain immediate post-explosion knowledge, opinions and attitudes; between Stages F and G.

5. It was soon evident, however, that it would not be possible to administer the first questionnaire to indoctrinees before the preliminary lectures, which were scheduled to commence only two or three days before the indoctrinees left London or Singapore, for the reason that changes in personnel were constantly occurring owing to the Suez crisis; as a result of which even an officer's presence at the preliminary lectures was no guarantee of his actually proceeding on the operation, whereas others would arrive who had had no preliminary lectures. However, provided the Control Group were carefully selected, this obstacle could be overcome; as the knowledge, opinions and attitudes of the Control Group could be accepted as representative of those of the Indoctrinee Force before they had been warned of the possibility of their accompanying the expedition. (Immediately after having been warned, presumably, they would start looking up their pamphlets, lecture notes, etc., dealing with nuclear warfare, discuss the matter with other officers, and generally take a far greater interest in the subject).

6. It was therefore decided to administer the post-lecture questionnaire (No. 2, now coded as "Q.F.1") to the indoctrinees; and exactly the same questionnaire, with the exception of the front (explanatory) page, to the Control Group, coded as "Q.F.O". No. 3, the post-explosion questionnaire, would now become "Q.F.2".

7. First experience of a nuclear explosion must have a powerful effect on one's attitude to this type of warfare, inevitably affecting to some extent one's morale. It was therefore hoped to be able to produce questionnaires which would enable an assessment of this change in morale to be made. Nevertheless, it was realized that in order to try to predict the morale effect of a nuclear weapon on troops in battle by means of a trial explosion, the best method would be to use formed units in a realistic exercise. The indoctrination of a force consisting entirely of officers of all ranks, up to and including Major-General, who merely stood and watched an explosion nearly six miles away, did not quite lend itself to the solution of this problem.

8. Finally, after much discussion, three kinds of questions were produced:

- (i) Questions assessing knowledge of the effects of a nuclear explosion. It was assumed that the QF1 answers would show greater knowledge than the QFO, and the QF2 than the QF1.
- (ii) Questions assessing attitudes towards the use of nuclear weapons in action, and comparing those of the Control Group with those of the Indoctrinee Force, and those of the latter before and after the explosion.

- (iii) Questions assessing opinions about nuclear warfare in general and this trial in particular, the most important being an open question in the post-explosion questionnaire just asking the indoctrinees what value they thought they had obtained from the operation.

Copies of questionnaires QF1 and QF2 are at Appendices B and C, and the front page only of QF0 for the British Officer Control Group is at Appendix D.

Living Conditions at the IF Camp*

9. In order to assess the attitudes of the indoctrinees both to the explosion itself and to completion of the questionnaires, it is necessary to realise the living conditions at their camp and how they were employed during the long waiting period. Their relief when the bomb actually exploded, mingled with their awe at the impressiveness of the spectacle, cannot otherwise be appreciated.

10. "Notes for Guidance of Buffalo Indoctrinees" on the living conditions they could expect were issued as an annexure to IF Instruction No. 2, and are reproduced at Appendix E of this report. The predictions were fairly accurate, except that the stay was six weeks instead of four and the weather was occasionally somewhat colder than the "Extreme Minimum" stated, at least at night. In other words, the August weather lasted well into the middle of September.

11. To begin with, the weather was very cold and frequently wet, though with occasional periods of sunshine. The wind was always strong and cold. If the sky was clear at night there was usually a frost at dawn. As the camp was pitched on limestone rock, covered by only a few inches of orange-red sand, all tent-pegs had had to be inserted with the aid of pneumatic picks. As a result insufficient pegs were inserted, and indoctrinees started by collecting rocks and fastening them to the brailing loops with wire and ropes to prevent their tents being blown away. The walls of the tents in most cases did not reach the ground, so that red dust was continuously blowing up inside and covering the beds, spare clothes, tables and chairs; and frequent "spring cleaning" was necessary. As time went on, officers borrowed shovels and built sand ridges round the walls to mitigate this nuisance; though nothing could be very effective during the strong gales which occasionally occurred. The air was, however, healthy and invigorating, and as the indoctrinees became acclimatized and learnt how to make themselves more comfortable the weather improved, and during the second three weeks there was more and hotter sunshine and less cloud and rain.

12. All British Indoctrinees will always remember the friendliness of the Australian and New Zealand officers, and testify to the value of the association and the resultant sharing of good times and bad, hardship and alcohol. Everything possible was done for the comfort of the Indoctrinees by the camp staff, under the direction of the Camp Commandant, [REDACTED], the Adjutant, [REDACTED] MC, and the Quartermaster, [REDACTED]. The first-named was at the time AA & QMG to [REDACTED] CBE., DSO., GOC Central Command, who was responsible for the administrative arrangements and to whom the gratitude of all Indoctrinees is due for releasing [REDACTED] from his other duties for this work.

* In Indoctrinee Force Instruction No. 1 at Appendix A, the name of this camp is given as "GUNDULPH"; but as it was 11 miles north of Watson, the nearest railway station, once occupied it was officially known as "Eleven Mile Camp".

13. The food was in general excellent, and was supplied in vast quantities to satisfy the growing appetites of the indoctrinees, who soon became involved in hard physical labour. Tribute must also be paid here to the enormous amount of work carried out cheerfully and very efficiently by the ORs of the Australian Camp Staff, comprising about 40 cooks, drivers and orderlies, who regularly worked a sixteen-hour day, seven days a week, looking after about 280 officers. On two occasions they apparently worked a twenty-four day - that is, 40 hours at a stretch!

Activities of the Indoctrinees

14. The first British indoctrinees had arrived at Eleven Mile Camp on 20th August; and that day were told that there would be a delay of eight days beyond schedule before the bomb explosion. (A week after they were told that the delay would extend a further six days). Volunteers were soon called for to assist the Maralinga scientists in the preparation of and laying out of targets (25-pr. guns, scout cars, dummy men, etc.), construction work in the Maralinga Cinema and in the Biological Laboratory, and the like; and almost every indoctrinee did several days work on such jobs between 23rd August and 4th September. For those who worked in the target area, this involved travelling 70 miles every day in 3-ton lorries on hard seats; and some of it was over bad ground.

15. On 30th August the news was broken that the firing of the bomb would be delayed another fortnight. An extended course of about 20 lectures by scientists having now been laid on, starting with one by [REDACTED] on September 5th, it was decided to administer the first (pre-bomb) questionnaires before this course started, as it was feared that otherwise the indoctrinees would become so sophisticated that they would know all the answers. It had previously been decided by the Australian D&T, [REDACTED], that the Australians and New Zealanders should also take the questionnaires; he also agreed to select and approach a suitable control group. (The Instructions page for the Australian Control Group is at Appendix F). QF1 was therefore given to 247 indoctrinees on the evening of 4th September, after a "pep-talk" asking for their co-operation.

16. Although a large part of most lectures must have been above the heads of a large proportion of the audience, the receptive minority differed somewhat at each lecture, according to whether the subject matter was blast, genetics, nuclear physics, nutrition, meteorology, heat effects, ionisation, decontamination, or whatever else it may be.

17. After this series of lectures was over (12th September), some work in the target areas was resumed. Visits were arranged to Maralinga Village, 12 miles away, to view the Power Station, Hospital, Laboratories, etc., and to Roadside (a further ten miles away) to examine the Control Room with its "console". Everything possible was done to explain how the explosion, as a scientific experiment, was laid on, and how records would be taken by films, accelerometers, radiac instruments, and so on. Also, the IF [REDACTED] [REDACTED] DSO., ADC., now laid on another series of lectures, this time by indoctrinees, together with "Brains Trusts", of Australian and New Zealand officers, who answered questions about the geography, economics, etc. of their respective countries; and talks of general interest by other indoctrinees. The weather by this time having improved somewhat, the last few of these talks were given in the open air.

18. At last, 31 days after arrival of the first British indoctrinees, "D-1" day was confirmed; and at 1.30 a.m. on 21st September the indoctrinees rose, breakfasted (2 a.m.!) and left the camp at 2.45 a.m. for the 35 mile run in 3-ton lorries to North Base, from which they were to witness the explosion. Positions were taken up by 6 a.m., and at 6.10 a.m. the voice of [REDACTED] came over the loudspeakers with: "Sorry, chaps!" They returned to Eleven Mile Camp for another breakfast (9.15 a.m.).

19. An invitation was now extended by [redacted] to half the indoctrinees to stay and witness the explosion of the second bomb. This offer had a rather mixed reception from those selected; some of them being extremely "browned-off" with waiting for the first bomb, which had not yet been exploded, whereas others jumped at the chance of seeing "two atom bombs for the price of one". An additional inducement was however offered to those indoctrinees who were to witness the second bomb in the form of a set of problems on the tactical uses of nuclear weapons, to be answered after the second explosion, with a board consisting of [redacted] and other scientists to rule on the scientific feasibility of the solutions. The problems were also given without delay to those indoctrinees who were not remaining for the second bomb, for immediate discussion; and as some of the problems bore a resemblance to some asked in the questionnaires, there is no doubt that these discussions affected to some extent the answers to the post-bomb questionnaire.

20. The day after these discussions (that is, on 26th September), another false alarm occurred; though this time the indoctrinees were not roused until 2.30 a.m. and the cancellation was not broadcast until 6.45 a.m., a quarter of an hour before zero. However, the next day (27th September) at 12 noon the indoctrinees had lunch, embussed, drove to North Base, and at 5 p.m. saw the bomb explosion at last. A report on their reactions (with which the author wholeheartedly agrees) is at Appendix G.

21. The next day, the first eight lorry-loads ("syndicates") of officers toured the target area in protective clothing and respirators, inspecting the damage; then went through the Army decontamination procedure and Health Control. Whilst they were doing this, "syndicates" 9 to 13 inclusive were filling in their post-bomb questionnaires, before their "walkabout" (as the exercise was termed). The day after (29th September), syndicates 1 to 8 filled in their post-bomb questionnaires whilst 9 to 13 inspected the target area. The reason for this split was that the first eight syndicates had no time to fill in their post-bomb questionnaires before their walkabout, whereas the second five syndicates had no time to fill in theirs afterwards. In fact early next morning (30th September), the first of the indoctrinees who were not going to witness the second explosion were flown back to Sydney, 41 days after their arrival at Maralinga.

22. The actual procedure, showing the stages relevant to the acquisition of knowledge and the formation of attitudes and opinions about nuclear warfare are listed below. This list should be compared with that in para. 3.

- Stage A. Preliminary Lectures (London or Singapore).
- Stage B. Journey to Maralinga.
- Stage C. Briefing at Maralinga.
- Stage D. First Tour of Target Area.
- Stage E. Assisting in Preparation of and Placing in Position of Targets.

(Completion of Pre-Bomb Questionnaire).

- Stage F. Intensive Course of Scientific Lectures.
- Stage G. Sporadic Visits and Further Lectures.
- Stage H. Waiting Time and Two False Alarms.
- Stage I. Witnessing of Explosion.
- Stage J(i) Tour of Target Area by two-thirds of Indoctrinees.

(Completion of Post-Bomb Questionnaire).

Stage J(ii) Tour of Target Area by remainder of Indoctrinees.

Stage K. Return to Duty Stations, or Awaiting Second Explosion.

23. Four extra stages have been inserted. It must be made clear, however, that Stage F was not a complete innovation, it having always been intended to introduce as full a course of lectures here as opportunity permitted. In the event it was found possible to expand somewhat the original intention.

RESULTS OF THE QUESTIONNAIRES

Characteristics of the Subjects

24. The pre-bomb questionnaire was completed by 247 indoctrinees and by 167 Control Group subjects (126 British and 41 Australian); a total of 414. By Service, Arm and Rank they were divided up according to the Tables in Appendix H. It will be noticed that all the UK indoctrinees who completed the questionnaires were Army officers, whereas the Australians and New Zealanders included 20 Air Force Officers and 10 Naval Officers. (In order to avoid the use of the long and clumsy term "Australians and New Zealanders" they will, with all respect, be henceforth referred to as ANZIF officers).

25. Of the 174 UKIF officers who completed QF1, 13 for one reason or another did not take QF2, leaving 161 who took both: 58 before their walkabout, and 103 after theirs. Of the 73 ANZIF officers, 23 did not take QF2, leaving 50 who took both: 17 before and 33 after their walkabouts. The large proportion of ANZIF officers who did not take the second questionnaire is due to the promptness with which they were flown away from Eleven Mile Camp almost immediately after their walkabouts.

Results of the "Knowledge" Questions

26. Questions Nos. 1, 2, 3, 4, 5, 7, 9, 10 and 11 of QF0 and QF1 are regarded as "knowledge" questions. The textbook answers are obtainable either from "Notes on Atomic Warfare" (WO Code No. 8912) and/or the Supplement thereto (WO Code No. 9014); or from the War Office coloured film "Effects of Atomic Weapons against Troops in the Field" (C 1089); or from both. Although improved answers have in the meantime become available for a few of the knowledge questions, little difference would result from altering any officer's score in accordance with the latest conclusions; and in any case the definitely wrong answers remain definitely wrong.

27. Scores of 2, 1 or 0 marks were allocated to the various answers according to the table in Appendix I. The highest possible score (= HPS) for QF0 or QF1 was 18. The average scores obtained are tabulated below:

	<u>Control Group</u>	<u>Indoctrinees</u>
UK:	10.4	12.6
A & NZ:	11.8 (Australian) (Army only)	10.9 (Australian and (New Zealand; Navy, (Army and Air Force)

Apparently the knowledge that they were proceeding to Maralinga, and the preliminary lectures and film-viewing of Stage A, raised the average score of the British indoctrinees by 2.2 marks. The ANZIF officers had a far shorter journey to Maralinga, with less warning than the British, and had no preliminary lectures or film-viewing, so it is not surprising that they are only half a mark above the British Control Group. What is surprising is that the score of the Australian Control Group is nearly one mark higher than that of the ANZIF officers. This may be due to the fact that, during the delay in firing, great interest was aroused in Australia about weather conditions and the risks of fall-out, and the whole subject was fully discussed in newspapers and weekly magazines.

28. An analysis has been made of knowledge of the British Officers by Army rank. The results are below:

<u>Army Ranks</u>	<u>Control Group</u>		<u>Indoctrinees</u>		<u>Difference</u>
	<u>Avge. Scores</u>	<u>(No.)</u>	<u>Avge. Scores</u>	<u>(No.)</u>	<u>Avge. Scores</u>
W.O. Scientists	—	—	13.8	(5)	—
Colonels & higher	9.0	(2)	11.7	(14)	2.7
Lt-Cols.	12.2	(21)	13.2	(37)	1.0
Majors	10.4	(68)	12.6	(80)	2.2
Junior Officers	9.3	(35)	12.0	(38)	2.7
	<u>10.4</u>	<u>(126)</u>	<u>12.6</u>	<u>(174)</u>	<u>2.2</u>

Apparently the lower the rank of the officer below Lt-Col., the less he knew; but the more he gained from the preliminary lectures, etc. (As a general rule, on repeating a test after instruction, those who knew less gain more than, but do not catch up with, those who knew more). It is true that some of the Lt-Cols. were instructors with special knowledge of nuclear warfare; but even after removing them, the average score for the remaining Lt-Cols. was still above that for Majors.

29. Questions Nos. 5 and 8 in QF2 were the same as Nos. 2 and 10 in QF1, and were repeated in order to ascertain if any increase in knowledge had occurred as a result of the briefing at Maralinga, witnessing the explosion itself, and of touring the target area beforehand and thereafter. This procedure would have involved the minimum possible instruction, and an increase of knowledge therefrom was not a foregone conclusion. Following the intensive course of scientific lectures which were actually given, however, if no increase of knowledge had occurred it would have been amazing. The HPS for these two questions was 7, and the results were:

	<u>QF1 (2 & 10)</u>	<u>QF2 (5 & 8)</u>	<u>Improvement</u>
UKIF BWA	4.9	5.7	0.8
" AWA	<u>5.3</u>	<u>5.8</u>	<u>0.5</u>
<u>UKIF (both)</u>	<u>5.2</u>	<u>5.8</u>	<u>0.6</u>
ANZIF BWA	4.6	5.9	1.3
" AWA	<u>4.4</u>	<u>5.3</u>	<u>0.9</u>
<u>ANZIF (both)</u>	<u>4.5</u>	<u>5.5</u>	<u>1.0</u>

"BWA" and "AWA" stand for "Before walkabout" and "after walkabout" respectively. The general rule previously mentioned seems again to be working, except in the line "ANZIF BWA"; but as this comprised only 17 officers the slight abnormality of their QF2 score (= 5.9) could easily be due to chance.

30. It must be mentioned here that a large number of officers stated, either on their questionnaire forms or orally, that they did not see much value in trying to remember a lot of technical details and scaling laws, seeing that in the event of nuclear warfare tables would immediately be issued from which they could read all the facts and figures they would require. In any case, the majority of them undoubtedly believed that high morale and tough discipline were far more important than technical knowledge and a scientific outlook in getting troops to face nuclear warfare.

Results of the "Opinion" Questions

31. Questions Nos. 6, 8, 12 and 13 of QF0 and QF1 are regarded as "opinion" questions. All but one (No. 12) are repeated in QF2 as Nos. 6, 7 and 9 respectively. Question No. 12, as it did not recur in QF2, will be dealt with first. It is a two-part question, and asks:

"Would you expect that the morale of troops would be more affected by learning that an atom bomb had been exploded over their home town than by learning that a heavy air raid with HE bombs (specifically, of $1\frac{1}{2}$ times the KT value of the A-bomb) had been made on the town?

"Yes (i.e., more affected). No.

"Would you consider they were right or wrong?

"Right. Wrong. Partly right, partly wrong."

32. To the first part of the question, the answer "yes (more affected)" was given by 96% of officers irrespective of whether they were UKIF or ANWIF, or Controls, or other consideration. To the second part, the answers of which 96% were:

<u>Right</u>	<u>Wrong</u>	<u>Partly right, partly wrong</u>
45%	20%	31%

Again, there were no significant differences between the controls and the indoctrinees, or between any other possible split.

33. As the question specifically states that the HE bombs would have $1\frac{1}{2}$ times the (blast) value of the atom bomb (and probably they would be spaced out so as to give greater coverage), it is apparent that it is not the thought of the blast effect that would worry the troops, but that of the flash, heat, and (above all) of the mysterious gamma rays.

34. The next question we shall consider is No. 6 in all three questionnaires. This reads:

"Lying down in the open on fairly flat ground, would you rather be:

"2 miles from a 20 KT bomb explosion	400 yds. from a 2000-lb. HE bomb explosion	50 yds. from a 25-pr. HE shell explosion
--	--	--

"Also, put a cross (X) under the one you would dislike most.

"(What is required is your genuine preference, whether rational or irrational; NOT what you think you ought to prefer on logical grounds.)"

In accordance with the general instruction, the answers to be indicated were to be underlined.

35. Percentage scores have been allocated to the three types of weapon concerned on the basis of +1 for each time one is underlined and -1 for each time a cross is placed underneath it, the results then being expressed as a percentage of the number of officers included in each count. The results are:

	<u>Indoctrinees (211)</u>		
	<u>Control Group (167)</u>	<u>Pre-bomb</u>	<u>Post-bomb</u>
Atom bomb	- 34%	- 36%	- 47%
HE bomb	- 6%	+ 2%	+ 11%
25-pr. shell	+ 38%	+ 33%	+ 40%

Although it appears at first sight that after the explosion dislike of the A-bomb increased, as did the popularity of the 25-pr. shell, the change is not so great that it could not easily be due to pure chance. Just over one-half the respondents underlined "25-pr. shell" and under-crossed "Atom bomb".

36. The reason that the percentages do not exactly cancel out in any of the above three columns is due to the fact that a few of the officers underlined their preference without placing a cross under their dislike, and others did vice-versa.

37. It should perhaps be made clear that no calculations of lethality or risk of injury were attempted in framing this question. The officers were intended to imagine themselves as being rather closer than they would like to be to these three types of explosion, and a purely emotional response was required, in order to discover if any significant differences appeared between the control group and the indoctrinees, and between the latter before and after the explosion. But none did.

38. The next question to be considered is No. 8 of QF0 and QF1, (No. 7 of QF2):

"If you were an Army Commander who required a blitz on an enemy concentration 4 miles behind their front lines, which would you prefer as the most likely to achieve your object:

"An atomic missile.	An HE bomb air attack of equivalent explosive force.	Heavy Artillery bombardment of equivalent explosive force.
---------------------	--	--

"Why"

The preferences were:

	<u>Indoctrinees</u>				
	<u>Control Group</u>	<u>UKIF</u>		<u>ANZIF</u>	
		<u>Pre-B.</u>	<u>Post-B.</u>	<u>Pre-B.</u>	<u>Post-B.</u>
A-missile	72%	81%	94%	57%	80%
HE bombs	14%	7%	4%	20%	16%
Hy. Arty.	14%	12%	2%	23%	4%

The differences between the UKIF and the ANZIF officers' results above, and between the pre-bomb and post-bomb results, are highly significant; that is, it is extremely unlikely that they are due to the chance effects of sampling ($0.01 > P > 0.001$). The differences between the results from indoctrinees who filled in QF2 before and after their walkabouts were not significant, and such results are therefore combined in the above table. Neither did the Australian Control Group results differ significantly from those of the British.

39. The reasons given for preferring the "atomic missile" were:

- (i) Greater effect (more damage and casualties), through flash, heat and gamma ray effects, with less effort.
- (ii) Greater morale effect.
- (iii) Surprise - total effect almost instantaneous instead of spread over minutes or hours; less opportunity for evasive action.
- (iv) Effect is more lasting.
- (v) Quicker to "lay on".
- (vi) "Logistics" - less transport required.

A few officers assumed (wrongly) that a "nominal" bomb was intended, and they pointed out the near-impossibility of delivering the equivalent of 20,000 tons of TNT by HE bombs or artillery shells.

40. Those who preferred air-bombing (HE) mentioned:

- (i) Not so dependent on weather conditions (as A-bomb).
- (ii) Area not contaminated, permitting immediate advance.
- (iii) Targets could be found more accurately; all key-points could be neutralized.
- (iv) In general, safer for own troops.
- (v) Surprise and effectiveness greater than Hy. Arty. (Also more demoralizing).
- (vi) Four miles is too far for accurate artillery bombardment.

41. Artillery choosers stressed:

- (i) Allows advance under cover of barrage.
- (ii) Ties enemy down longer.
- (iii) No radiation hazards to avoid or monitor during advance.
- (iv) Very great accuracy.
- (v) Effects more predictable.
- (vi) Destruction over a greater area, with more economic application.
- (vii) Target not worth an atomic missile.
- (viii) Not affected by weather.

One officer pointed out (concerning an atomic missile) the risk of "putting all your eggs in one basket".

42. These results indicate that with an increase in knowledge about the possibilities and limitations of atomic missiles, and a live demonstration, comes a higher probability of their being accepted by officers as a practical weapon in the present day armoury.

43. The final "opinion" question to be dealt with in this section is No. 13 in QF0 and QF1, (No. 9 in QF2):

"In my opinion, nuclear weapons will make war, as an 'art':

"Somewhat more difficult	Much more difficult	Very much more difficult	Almost impossible"
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Incidentally, these choices were not sufficient for all the indoctrinees, some of whom amended their papers to read in addition: "No more difficult", "Easier", or "Quite impossible".

44. There were no significant differences between the UKIF and the ANZIF, or between those who completed their second questionnaires before and after their walkabout. The table of percentage results, combined accordingly, is as follows:

	<u>Indoctrinees</u>		
	<u>Control Group</u>	<u>Pre-bomb</u>	<u>Post-bomb</u>
Easier	1%	2%	1 $\frac{1}{2}$ %
No more difficult	$\frac{1}{2}$ %	2%	1%
Somewhat more difficult	37%	34%	27%
Much more difficult	24%	20 $\frac{1}{2}$ %	21%
Very much more difficult	22%	27%	38%
Almost impossible	15%	14%	11%
Quite impossible	$\frac{1}{2}$ %	$\frac{1}{2}$ %	$\frac{1}{2}$ %
	<u>100%</u>	<u>100%</u>	<u>100%</u>

There is a distinct tendency, as knowledge about the bomb increases, for more officers to consider that nuclear weapons make war as an "art" "very much more difficult", and for fewer officers to consider that they make war either only "somewhat more difficult" or else "almost impossible". It is very unlikely that these differences are solely due to chance ($0.05 > P > 0.02$).

Results of the Remaining Questions

45. Questions Nos. 1 to 4 in the post-bomb questionnaire (QF2) asked, in effect, how the noise, flash, blast, and heat-wave of the explosion accorded with the expectations of the indoctrinees. The actual questions combined with the results are below:-

"1. The noise of the explosion was:

	<u>Numbers</u>	<u>Percent</u>
"Far louder than	3	1½
"Somewhat louder than	13	6
"About as loud as	28	13½
"Less loud than	167	79
"I expected."	<u>211</u>	<u>100%</u>

"2. The flash was:

"Far brighter than	132	62½
"Somewhat brighter than	38	18
"About as bright as	37	17½
"Less bright than	4	2
"I expected."	<u>211</u>	<u>100%</u>

"3. The blast was:

"Far stronger than	2	1
"Somewhat stronger than	4	2
"About as strong as	27	13
"Less strong than	177	84
"I expected."	<u>210</u>	<u>100%</u>

"4. The heat-wave was:

"Far hotter than	112	53
"Somewhat warmer than	59	28
"About as warm as	34	16
"Less warm than	6	3
"I expected."	<u>211</u>	<u>100%</u>

So that, in general, the indoctrinees were impressed by the flash and the heat-wave, but disappointed in the noise and the blast (at 5¼ miles). The two latter were refracted well over their heads by ground winds which were blowing from the indoctrinees towards the explosion.

46. The final question, No. 10 of the Post-bomb Questionnaire (QF2), reads:

"What in your opinion was the value to you as an officer in actually having been in the vicinity of an atomic explosion? What did you get from it that you could not have got from a coloured sound-film and well-faked demonstrations? (Please write something between two or three sentences to two or three paragraphs.)"

Eight officers (four UKIF and four ANZIF) did not answer this question. Seven of them wrote nothing at all; the eighth wrote: "of considerable value!"

47. The replies of the 203 officers concerned were analysed and classified into "typical statements", of which there were 37 (listed in Appx J). The total number of statements made was 669; 543 by the UKIF (an average of 3.38 each), and 126 by the ANZIF (= 2.52 each).

48. One hundred and twenty officers, forming 53% of the UKIF and 68% of the ANZIF (57% of the total number), wrote statements which were typified as: "Seeing is believing." "There is no substitute for the real thing." "The difference between an academic lecture (or theoretical knowledge) and a practical demonstration." Seventy-seven more (that is, all but 14 of the remainder) wrote statements which necessarily inferred the previous one: e.g. "It is impossible to fake the heat wave." "The flash could not possibly be faked," and the like. So that altogether 197 officers out of 211 (= 93%) agreed that some or all of the experience could not possibly be faked.

49. The point next most frequently mentioned was that of subsequent lecturing and training activities. This opinion may be summarized: "Troops are more interested in a lecturer who was there. Having been there, I can lecture with more authority, more convincingly, on the subject." Such remarks were made by 98 officers (46%); 13 ANZIF (26%) and 85 British (53%). The difference here is significant. It had been impressed on the UKIF officers (and perhaps not on the ANZIF) that on their return from the operation they would have to give lectures on the subject of atomic warfare.

50. 42 of the 103 UKIF officers (= 41%) and 9 of the 33 ANZIF (= 27%) who filled in their post-bomb questionnaires after the walkabout mentioned that the examination of the target response results was far more important than actually witnessing the "bang". They made remarks such as: "Utter desolation"; "The vastness of the devastation"; "Utter obliteration".

51. The next most popular remark was one which may be typified as: "I now realize both the power and the limitations of this weapon, and can now put it into its correct perspective with other weapons". This opinion was expressed by 24 UKIF Officers (= 15%) but by only 3 ANZIF (= 6%).

52. Twenty UKIF (= 12%) and five ANZIF (= 10%) commented on the impressiveness of the degree of heat felt, and the speed of its arrival (simultaneously with the flash). Some mentioned here the importance of heat-resistant materials for clothing.

53. Seventeen UKIF and five ANZIF (being 10% of each) would have liked to have been much closer (in properly constructed infantry positions). They thought they would have got more value from the operation; and some recommended that future indoctrinees should be much closer. Many officers also suggested to the author in conversation that formed units in trenches, in a realistic exercise should be used in order to assess the shock effect of a nuclear explosion on their later reactions. This is therefore included as a recommendation of this report.

54. Although no more typical statements will be dealt with in this section, reference will be made to others in the following one. It must be borne in mind that the fact that only a small percentage of officers made any particular statement does not mean that the majority were of a different opinion. Many others may have made a similar statement if only it had occurred to them.

The Possibility of an Effective Faked "Indoctrination"

55. Seventeen Indoctrinees stated that it was impossible to appreciate the sequence of events in time and space from a film, one of the main troubles being that the "editor" never allowed you to look at anything for more than a few seconds at a time; the next instant you had been miraculously transported a mile or so away and were either again watching the last few seconds of the same event or were now seeing it half-a-minute later with no interval of time. At the actual explosion, the indoctrinees watched the fire-ball and the development of the smoke cloud for several minutes before allowing their attention to wander, whereas one has no chance of doing this when watching a film. It is suggested that if the producer were content just to start running the film as soon as possible after the explosion and continue without cutting for several minutes, the audience would have a chance to see things as they really happened. Should it be necessary later to make cuts, then the commentator should say: "Five minutes later", or a sub-title should be displayed, so that the audience may assess the development correctly. The main difficulty with a film is however in conveying the effect of the tremendous height of the cloud; that is, of the large angle subtended by the eye of the observer.

56. The effect of the flash was very well faked in the colour film C 1089. (Some officers remarked on this in their replies). The faking of the heat effect would be more difficult, but it should be quite possible to construct an apparatus which produced intense heat for a short time, fitted with a shutter system which opened for a second or so to enable the rays to be beamed on to an audience. This apparatus may be expensive, but it should be far cheaper than the fares of a large number of officers from Europe to Maralinga.

57. It is suggested that an audience of troops could be assembled with their backs to a large cinema screen and the heat apparatus, facing another screen showing a film of an ordinary landscape. They hear a count-down to the word "flash", when the landscape is illuminated as previously, and simultaneously the shutters of the heat apparatus open for a second. They then receive the "about-turn", and turn to see the large screen displaying the last of the rising fireball and the development of the mushroom cloud.

58. Nearly 40% of the officers who filled in their post-bomb questionnaires after their walkabout stated that this was the most important part of the whole affair. Nevertheless, it is the easiest to fake, and could be very realistic provided that actual articles of military equipment damaged at Maralinga (on this, previous or subsequent occasions) are laid out in a training area at the exact distances from Ground Zero at which they were found after the explosion. Exactly similar but undamaged equipment could be laid out at their original distances from GZ on another area; and these areas could be visited by troops before and after the faked (screen) explosion. First they would visit the undamaged equipment; then the cinema demonstration room; and then the damaged equipment. It is suggested that this would give the best possible facsimile of the Maralinga "indoctrination".

CONCLUSIONS, RECOMMENDATIONS, AND ACKNOWLEDGEMENTS

Conclusions

59. In interpreting these conclusions, it must be borne in mind that in many cases it is impossible to decide which effects were due to witnessing the actual explosion and which to the intensive course of lectures and demonstrations experienced by the indoctrinees prior to the explosion.

60. The conclusions are summarized below:

I. Knowledge of nuclear weapons and warfare

- (a) The British Indoctrinees, after arrival at Maralinga but before an intensive course of scientific lectures, knew more about nuclear weapons and warfare than the British Control Group. (This finding does not apply to the Australians.)
- (b) On average, the higher the rank of the British Officer (up to Lt-Col.) the more he knew about nuclear weapons.
- (c) After the intensive course of lectures and the actual explosion, there was an increase in knowledge of all groups of Indoctrinees.

II. Opinions about nuclear weapons and warfare

- (d) Ninety-six percent of all respondents (Indoctrinees and Controls), were of the opinion that the morale of troops would be more affected by learning that an atom bomb had been exploded over their home town than by learning that a heavy air raid with HE bombs (specifically, of $1\frac{1}{2}$ times the KT value of the A-bomb) had been made on the town.

- (e) Just over one-half of all respondents stated that, if lying down in the open on fairly flat ground, they would rather be 50 yds. from a 25-pr. HE shell explosion, and would most dislike being 2 miles from a 20 KT bomb explosion; (the third choice being 400 yards from a 2000-lb. HE bomb explosion).
- (f) For a blitz on an enemy troop concentration 4 miles behind their front lines, an atomic missile was preferred by 72% of the Control Group, by 84% of British Indoctrinees before the explosion, and by 94% afterwards. These results indicate that with an increase in knowledge about the possibilities and limitations of atomic missiles, and a live demonstration, comes a higher probability of their being accepted by officers as a practical weapon in the present day armoury.
- (g) There is a distinct tendency, as knowledge about the bomb increases, for more officers to consider that nuclear weapons make war as an "art" "very much more difficult", and for fewer officers to consider that they make war either only "somewhat more difficult" or else "almost impossible".
- (h) It may be deduced from comments made in answering questions, both written and oral, that the great majority of respondents considered that morale and discipline were far more important than technical knowledge in getting troops to face nuclear warfare.

III. Reactions to the Buffalo Indoctrination

- (i) In general, the Indoctrinees were very impressed by the flash and heatwave of the atomic explosion, but disappointed in the noise and the blast (at $5\frac{3}{4}$ miles), which were refracted by ground winds over their heads.
- (j) In an open final question, 57% of Indoctrinees stated that the value in actually having been in the vicinity of an atomic explosion consisted in what may be summarized as: "There is no substitute for the real thing". "Seeing is believing". An additional 36% necessarily implied this by statements such as: "It is impossible to fake the heatwavethe flash (etc.)".
- (k) Fifty-three percent of UKIF officers, but only 26% of ANZIF, stated that: "Troops are more interested in a lecturer who was there. Having been there, I can lecture with more authority, more convincingly, on the subject".
- (l) Forty-one percent of the UKIF officers, but only 27% of the ANZIF, who filled in their post-bomb questionnaires after their walkabouts, mentioned that the examination of the target response results was far more important than actually witnessing the "bang".
- (m) The next most popular remark may be typified as: "I now realize both the power and the limitations of this weapon, and can now put it into its correct perspective with other weapons". This opinion was expressed by 15% of UKIF officers and by 6% of ANZIF.

Recommendations

61. It is recommended that:

- (a) If it is desired to assess the morale and shock effects of a nuclear explosion on troops, a formed unit taking part in a realistic exercise should be used. The speed and quality of their reactions (e.g. in resumption of SA fire) should provide valuable material for analysis and predictions.
- (b) The possibility of producing a split-second heat radiator such as suggested in para. 56 should be investigated; and the use thereof, together with undamaged and damaged military equipment and a cinema demonstration (as detailed in paras. 57 and 58), as giving the best possible facsimile of a live indoctrination, should be considered.

Acknowledgements

62. Gratitude must be expressed for the valuable assistance given by AAG, ODO at Starmore in the selection of a Control Group almost exactly similar in rank and arm to the Indoctrinee Force, and for the distribution to them of their appropriate questionnaires.

63. An acknowledgement must also be made of the assistance received from [REDACTED] of Science 1, in the distribution and collection of questionnaires at the site, and for information and advice from him subsequently. Also to [REDACTED] and [REDACTED] both of AORG, for valuable assistance in the coding and summarizing of results.

BUFFALO TRIALS

16th July, 1956.

INDOCTRINEE FORCE INSTRUCTION NO. 1

GENERAL

1. Some 250 officers of the Armed Forces of the UNITED KINGDOM, AUSTRALIA AND NEW ZEALAND will participate as indoctrinees in the first of a series of nuclear trials to be carried out in August/September, 1956, at MARALINGA. 177 of these officers will be free from Home and overseas Commands of the British Army and 2 from the Royal Navy. They will travel by air.
2. This indoctrinee force will be one of a number of "groups" taking part in the trials and will be referred to in later instructions as the "IF Group".
3. After basic instruction in LONDON or SINGAPORE and detailed briefing at MARALINGA on the nature and conduct of the trials, indoctrinees will be exposed at a safe distance to the flash, thermal and blast effects of a nuclear explosion. They will make a conducted tour of the firing area and of the various items of Service equipment, vehicles, structures, etc, exposed for trials purposes, both before and after firing.

AIM

4. To enable these selected officers:
 - (a) To experience the effects of a nuclear explosion
 - (b) To examine the effects of such explosion on the ground and on weapons and equipment
 - (c) To pass on their experience to other members of the Armed Forces at the conclusion of the trial.

METHOD

5. ASSEMBLY
 - (a) In the UNITED KINGDOM
 - (i) Officers attending from Home Commands, BAOR, WEST AFRICA, MALTA and GIBRALTAR will report to No 1 Army Air Transit Unit, 209 Harrow Road, Paddington, London, W.2, not later than 1600 hours Thursday, 9th August, 1956. There they will receive their passports and air travel tickets and have their medical certificates and the other documents detailed in para 14 below checked. They will also write in the book provided, their addresses and telephone numbers in case changes in travel arrangements prove necessary.
 - (ii) Officers from BAOR, WEST AFRICA, MALTA and GIBRALTAR will be required to show their AFsW 5133.
 - (iii) Officers will be responsible for making their own arrangements for accommodation in the LONDON area from the time of arrival until departure for AUSTRALIA.

(b) In SINGAPORE

All officers except those covered by sub-para (a) above and the officer from the CARIBBEAN area will assemble and be accommodated under arrangements made by GHQ FARELF. They will report in SINGAPORE not later than 18th August, 1956. GHQ FARELF will notify all concerned (copy to War Office MT11) of the complete assembly arrangements including arrangements for the preliminary instruction detailed in para 6(b) below.

6. PRELIMINARY INSTRUCTION

(a) In LONDON

(i) A two day period of preliminary instruction will be held in the Recreation Room, Wellington Barracks, LONDON, on Friday and Saturday, 10th and 11th August, 1956. This will be attended by all officers assembling in London. Syllabus is attached as Annexure "A".

(ii) Dress - Service Dress or Battle Dress

(b) In SINGAPORE

Preliminary instruction will be given to personnel attending from Overseas Commands, less those from BAOR, GIBRALTAR, MALTA, WEST AFRICA and the CARIBBEAN Area at SINGAPORE on 19th and 20th August, 1956, under arrangements made by GHQ FARELF and the Chief Instructor, Joint School of Chemical Warfare [REDACTED]. The latter will arrange all further details with GHQ FARELF, through the War Office (MT11). A syllabus on similar lines to that attached as [REDACTED] will be sent to GHQ FARELF by [REDACTED] through the War Office (MT11), for reproduction and issue to all concerned.

7. MOVEMENT OUTWARD

(a) Officers assembling in UNITED KINGDOM

The bulk of these will be despatched either by BOAC/QUANTAS scheduled flights leaving LONDON between 12th and 19th August to SYDNEY or by a Hastings aircraft leaving LONDON on 14th August direct for MARALINGA. Those routed via SYDNEY will be moved by local charter aircraft to MARALINGA. A few officers will be moved by scheduled trooping flights to SINGAPORE. Thence they will move to MARALINGA with officers assembling in SINGAPORE.

(b) Officers assembling in SINGAPORE

These officers will be despatched from SINGAPORE on a charter aircraft direct to MARALINGA.

(c) Full arrangements for outward movement are given in [REDACTED] and [REDACTED] attached.

8. PROGRAMME IN MARALINGA

(a) Officers will have a rest period of from one to five days after arrival at MARALINGA.

(b) It is intended that the programme of work should be as follows:-

~~XXXXXXXXXX~~

D - 3: Rehearsal and pre-firing tour of area and equipment
D - 2 } Instruction in the nature and conduct of the trials
D - 1 }
D Day: Witness explosion
D + 1: First half of IF Group tour firing area
D + 2: Second half of IF Group tour firing area

- (c) In order to help in the assessment of the value of indoctrination during trials of this nature, officers will be asked to complete an individual questionnaire at MARALINGA before 'D' Day and a follow-up questionnaire later.
- (d) Whilst theoretically some officers could be moved out of MARALINGA from D + 2 onwards, owing to the uncertainty of the date of firing, a few days delay is expected before movement can start.

9. MOVEMENT ON RETURN

(a) Officers originally assembling in UNITED KINGDOM

(i) The bulk of these officers will be lifted by local charter aircraft from MARALINGA to the SYDNEY area to await seats on scheduled BOAC/QUANTAS aircraft to final destination.

(ii) One Hastings load will be flown direct from MARALINGA to the UNITED KINGDOM.

(b) Officers originally assembling in SINGAPORE

All these officers will be moved in the same way as those in para 9(a)(i) above.

10. DRESS

ADMINISTRATION

(a) During Travel

(i) By civilian airlines - civilian clothes

(ii) By Service aircraft - uniform - (Service dress or Battle Dress).

(iii) Officers proceeding to Australia by Service aircraft may return by civilian airlines and vice versa, therefore, both uniform and civilian clothes are required.

(b) In MARALINGA Area

(i) Two suits of Australian Army Battle Dress per officer will be issued as working dress on arrival at GUNDULPH Camp. Great coats will also be provided.

(ii) For the examination of effects after the explosion special protective clothing will be provided.

(iii) Due to shortage of water for laundry purposes a plentiful supply of socks, shirts and underwear should be taken.

(c) In SYDNEY Area

(i) Due to the limitation on weight little formal dress can be taken but a lounge suit will be required.

- (ii) Nearly all officers will be staying either on the outward or return journey with the Australian Army. Those in possession will wear service dress whilst attached, others will wear British battle dress.

EQUIPMENT

11. (a) Only essential equipment will be taken. This is:-
- (i) web belt,
 - (ii) respirator anti-gas, light MK6
 - (iii) water bottle,
 - (iv) small pack (for pack meals)
 - (v) binoculars
- (b) The respirator must be serviceable and properly fitted in accordance with Section 11 of "Gas Training 1951", War Office Code No.8511 paras 3 to 6 inclusive.
- (c) Officers who require to wear spectacles at all times will be in possession of Service spectacles with flattened side members designed for wear with respirators. Instructions are contained in Section 11 of "Gas Training 1951".

12. BAGGAGE

- (a) Baggage limit for all personnel regardless of method of travel will be restricted to 44 pounds, except as especially authorised at para 23 below.
- (b) Articles such as respirator, binoculars, trench coat, etc, will not be weighed but a brief case or small bag retained by the individual while on the aircraft may be weighed and counted against the limit of 44 pounds.
- (c) Officers are strongly advised to carry with them two bags, one to be retained during the flight with such items as shaving kit, towel, slippers, etc, plus a change of socks, shirt, etc.

13. PASSPORTS

- (a) Passports of all officers of the Indoctrinee Force from the United Kingdom, BAOR, GIERALTAR, MALTA and WEST AFRICA, will be forwarded to the War Office (PAI Family Passages) by not later than 18th July, 1956.
- (b) The requisite visas will be obtained by the War Office, renewals will be made if required and passports will be re-issued to officers on arrival at No 1 Army Air Transit Unit.
- (c) Passport arrangements for over-seas Commands (less BAOR, GIERALTAR, MALTA and WEST AFRICA) will be under Command arrangements.

14. MEDICAL

- (a) International Certificates of Vaccination/Inoculation
- (i) All officers of the Indoctrinee Force will be in possession of valid International Certificates of Vaccination/Inoculation against:-

Smallpox (F Med 101) dated not less than eight days (except in the case of re-vaccination when valid immediately) nor more than two years before expected date of departure.

Cholera (F Med 102) dated not less than six days (except in the case of re-inoculation within six months of previous inoculation when valid immediately) nor more than two months before expected date of departure.

Yellow Fever (F Med 103) dated not less than 10 days nor more than five years and eight months before expected date of departure.

(ii) The times given will ensure that re-vaccination/inoculation is not required for the return journey.

(iii) All immunization except against Yellow Fever can be carried out at the nearest medical centre. Immunization against Yellow Fever is carried out at specially authorized centres addresses of which may be obtained from the nearest medical headquarters.

(b) TABT

All personnel will be fully protected by TABT prior to leaving permanent duty stations. Appropriate entries must be shown in AB 439.

(c) Blood Count and Chest X-ray

In the officers' own interest they will be subjected to a blood count as for workers with radioactive substances plus a chest X-ray. Both to be completed prior to leaving permanent duty stations.

(d) Medical Examination

All officers not now serving in the tropics will be medically examined for fitness to serve in the tropics and issued with certificates of fitness before leaving permanent duty stations.

(e) Dental Treatment

All personnel will have any necessary dental treatment completed prior to leaving permanent duty stations.

15. ACCOMMODATION

(a) At MARALINGA

Officers will be accommodated during their stay in the MARALINGA area in a tented camp to be erected by the Australian Army at GUNDULPH, 11 miles North of WATSON near MARALINGA, about 600 miles North West of ADELAIDE. Conditions will be austere and water in short supply. This camp will be run by the Australian Army who will provide bedding and camp equipment.

(b) At SYDNEY

Outward journey - Those officers who do not fly direct from UK or SINGAPORE into MARALINGA will be accommodated by the Australian

Army in SYDNEY except for seven senior officers who will be accommodated in a Civilian Club.

Return journey - All officers except the thirtythree returning to UK direct from MARALINGA on the HASTINGS will be accommodated in SYDNEY. Owing to the uncertainty of the date of firing, it will probably be a month after 'D' day before the airlines can move the last officer out of SYDNEY. Waiting time in SYDNEY is likely to average 14 days. The Australian Army authorities have at considerable inconvenience made special arrangements to accommodate the bulk of the Indoctrinee Force with Army units for the period required whatever that period may turn out to be. It is hoped to accommodate seven senior officers, not below the rank of Colonel at SYDNEY clubs. All details will be given out in due course.

16. DISCIPLINE

- (a) For purposes of discipline, all military officers from the British Army comprising the Indoctrinee Force will be attached to the Royal Air Force under the provisions of Section 179A of the Air Force Act and Section 179A of the Army Act and thus subject to the Air Force Act.
- (b) In order to effect such attachment a disposal order, an example of which is shown below, will be published by Headquarters, Eastern Command and GHQ F A R E L F immediately prior to departure of the Indoctrinee Force from London and Singapore. A copy of the order will be forwarded to Headquarters Bomber Command, Royal Air Force.

"The personnel detailed below (individual names to be inserted) will serve with the BUFFALO TASK FORCE and whilst so serving will be subject to the provisions of Section 179A of the Air Force Act and Section 179A of the Army Act".

- (c) Headquarters, Bomber Command, Royal Air Force, will publish a reciprocal attachment order upon receipt of the orders mentioned in sub para (b) above.
- (d) Nominal rolls to be used for the purpose of the orders will be forwarded by the War Office (MTL) to Headquarters, Eastern Command and GHQ FARELF.

17. WEAPONS

No weapons or ammunition will be taken to Australia.

18. PAY AND ALLOWANCES

See Annexure 'D' attached.

19. POSTAL

- (a) Postal address for the Indoctrinee Force will be:-

Rank, Name,
IF Group,
British Forces Post Office 151.

- (b) British Forces Post Office 151 must be written in full to avoid possible confusion with BAOR.

[REDACTED]

20. NOMINAL ROLL - INDOCTRINEES AND RESERVES

Nominal roll of all indoctrinees and reserves, by Commands, showing ultimate destinations is attached as Annexure "E". Officers who become casualties after arrival in LONDON or SINGAPORE will be replaced by reserves nominated by the War Office (MTLI) and GHQ FARELF respectively.

COMMAND AND CONTROL

21. BUFFALO TRIALS EXECUTIVE STAFF

Trials Director: [REDACTED]
Trials Deputy Director: [REDACTED]
Trials Co-ordinator: [REDACTED]
Co-ordinator of Indoctrinee Force: [REDACTED]

22. Personnel assembling at SINGAPORE

These officers will be put under command, for the duration of their stay in SINGAPORE and whilst en route to MARALINGA, of a senior indoctrinee to be nominated by GOC-in-C FARELF. This officer will be assisted by [REDACTED] CI of the JSCW.

23. Personnel assembling in LONDON

These officers will be under the command of [REDACTED] from 9th August, 1956, until return to permanent duty stations.

The Commander will be assisted by:-

[REDACTED]	GS
[REDACTED]	GS and Liaison with [REDACTED]
	Trials Staff
[REDACTED]	GS
[REDACTED]	Adm
[REDACTED]	Mov
[REDACTED]	Pay/Finance

The above officers will be allowed an additional ten pounds excess baggage to cover the carriage of essential papers/documents, etc, related to their special duties.

24. Command and Control in AUSTRALIA

[REDACTED] assisted by the staff detailed in para 23 above will exercise command over the whole Indoctrinee Force as a group on arrival in AUSTRALIA.

25. Overall Command in AUSTRALIA

The Indoctrinee Force will be under the overall command of the BUFFALO TASK FORCE Commander, [REDACTED] who is in charge of all military groups.

26. Conducting Officers

Certain Officers from amongst the indoctrinees will be appointed as Conducting Officers. They will be selected from those with some scientific background and will act as leaders during the trials.

[REDACTED]

SECURITY

27. Positive Vetting

All officers comprising the Indoctrinee Force will be positive vetted prior to emplaning.

28. Classified Documents

Owing to the difficulty of safeguarding classified documents whilst in the MARALINGA area, the minimum number of documents of high security grading will be taken.

29. Cameras

Cameras may be taken for use during the journey to and from Australia but must be handed in immediately on arrival at GUNDULPH Camp.

30. Regulations and Instructions

Whilst in the MARALINGA area officers comprising the Indoctrinee Force will comply with all security regulations and instructions issued by the Trials Director.

(Signed) [REDACTED]

for [REDACTED]
Director-General of Military Training.

Rank Arm of Service
Initials Branch if RA, Regt.
and Name if Cav. or Inf., etc.

INSTRUCTIONS

1. This is NOT a "Test" in the sense of being competitive as between one officer and another; the intention is to compare the knowledge and opinions of the Indoctrinee Force as a whole before and after the explosion.
 2. No reports on individual officers will be made as a result of the completion of these forms. The procedure can therefore have no effect whatever on your future career. No names will be mentioned in the AORG Report on the exercise. Your name is required merely for the purpose of attaching your pre-bomb questionnaire to the subsequent one.
 3. Please complete the questionnaire by underlining the answers you consider to be the correct ones. Do not underline the words "No idea" if you think you can make a better-than-chance guess at the right answer. If you wish to write more fully on any point, please use the inside of the plain backing sheet. All comments and opinions will be welcomed.
-

UNDERLINE THE CORRECT ANSWERS

1. The "Nominal" Bomb, used as a basis for tabulating varying degrees of damage at specified distances, is of 20 KT, exploded at a height of:

1000 ft. 2000 ft. 2500 ft. 3000 ft. 5000 ft. No idea.
above ground zero.

2. Gamma radiation is reduced to:

40% 30% 25% 20% 10% 0% No idea.
by a protection of 3" of steel, 9" of concrete, or:
15" 18" 24" 30" 36" No idea.
of well-packed earth.

3. The limit of second-degree burns (blisters) on unprotected skin from a 20 KT bomb would be:

2000 yds. 3000 yds. 4000 yds. 5000 yds. No idea.

4. If you looked at an airburst of a 20 KT bomb two miles away, without bothering to protect your eyes in any way, would you expect the probable result to be total blindness for:

Life. Six months. One week. One hour.
Ten minutes. Ten seconds. No idea.

5. What percentage of immediate personnel casualties would you expect if men were in open slit trenches 700 yards from a "nominal" A-bomb explosion?

50%. 60%. 70%. 80%. 90%. 100%. No idea.

6. Lying down in the open on fairly flat ground, would you rather be:

2 miles from a 20 KT bomb explosion 400 yds. from a 2000-lb. HE bomb explosion. 50 yds. from a 25-pr. HE shell explosion.

Also, put a cross (X) under the one you would dislike most.

(What is required is your genuine preference, whether rational or irrational; NOT what you think you ought to prefer on logical grounds.)

7. How is the thermal effect of an atomic missile affected by mist or fog?

Increased. Not affected. Decreased. No idea.

(Continued 8/)

UNDERLINE THE CORRECT ANSWERS

8. If you were an Army Commander who required a blitz on an enemy concentration 4 miles behind their front lines, which would you prefer as the most likely to achieve your object:

- | | | |
|--------------------|--|--|
| An atomic missile. | An HE bomb air attack of equivalent explosive force. | Heavy Artillery bombardment of equivalent explosive force. |
|--------------------|--|--|

Why?
.

9. If you are retiring before an overwhelmingly superior force, and it has been decided to hinder this advance by means of an atomic missile, should the burst be:

- | | | |
|------------------|----------------|---------------|
| Underground. | Surface. | Low airburst. |
| Medium Airburst. | High Airburst. | No idea. |

Why?
.

10. In training troops to avoid becoming A-bomb casualties when in the open, what do you consider would be the most important "immediate action" drills in which you could exercise them?
(TWO may be marked.)

Immediately on perceiving an extremely bright light, to:

- | | | |
|--------------------------|--|---------------------------------------|
| Put on gloves. | Close their eyes. | Run for cover if within twenty yards. |
| Fall flat on the ground. | Turn their backs to the light. | Cover eyes with forearm. |
| Pull muffler over face. | Suggestion for drill not mentioned above, if you have one: | |
| | | |
| | | |

11. As a means of delaying an enemy's advance, do you think a wide river is a greater or lesser obstacle since the introduction of nuclear weapons?

- | | | | |
|-------------------|----------------|------------------|----------|
| Greater obstacle. | No difference. | Lesser obstacle. | No idea. |
|-------------------|----------------|------------------|----------|

Why?
.

(Continued 12/)

UNDERLINE THE CORRECT ANSWERS

UNDERLINE THE CORRECT ANSWERS

12. Would you expect that the morale of troops would be more affected by learning that an atom bomb had been exploded over their home town than by learning that a heavy air raid with HE bombs (specifically, of $1\frac{1}{2}$ times the KT value of the A-bomb) had been made on the town?

Yes (i.e., more affected). No.

Would you consider they were right or wrong?

Right. Wrong. Partly right, partly wrong.

13. In my opinion, nuclear weapons will make war, as an "art":

Somewhat more Much more Very much Almost
difficult. difficult. more difficult. impossible.

End of Questionnaire

Rank Arm of Service.
Initials
and Name Branch if RA, Regt.
if Cav. or Inf., etc.

INSTRUCTIONS

1. You will notice that many of these questions you have already answered in the previous questionnaire. This is to ascertain whether anything in your recent experience has made you change your mind about the correct answers.
 2. You are reminded that no reports on individual officers will be made as a result of the completion of these forms. Your name is required merely for the purpose of attaching your pre-bomb questionnaire to this one.
 3. Please write as much as you like on the inside of the backing sheet about any point you wish to bring up.
-

UNDERLINE THE CORRECT ANSWERS

1. The noise of the explosion was:

- | | | | |
|-----------------|----------------------|------------------|----------------|
| Far louder than | Somewhat louder than | About as loud as | Less loud than |
| | | | I expected |
-

2. The flash was:

- | | | | |
|-------------------|------------------------|--------------------|------------------|
| Far brighter than | Somewhat brighter than | About as bright as | Less bright than |
| | | | I expected |
-

3. The blast was:

- | | | | |
|-------------------|------------------------|--------------------|------------------|
| Far stronger than | Somewhat stronger than | About as strong as | Less strong than |
| | | | I expected |
-

4. The heat-wave was:

- | | | | |
|-----------------|----------------------|------------------|----------------|
| Far hotter than | Somewhat warmer than | About as warm as | Less warm than |
| | | | I expected |
-

5. Gamma radiation is reduced to:

- | | | | | | | |
|-----|-----|-----|-----|-----|----|---------|
| 40% | 30% | 25% | 20% | 10% | 0% | No idea |
|-----|-----|-----|-----|-----|----|---------|

by a protection of 3" of steel, 9" of concrete, or:

- | | | | | | |
|-----|-----|-----|-----|-----|---------|
| 15" | 18" | 24" | 30" | 36" | No idea |
|-----|-----|-----|-----|-----|---------|

of well-packed earth.

6. Lying down in the open on fairly flat ground, would you rather be:

- | | | |
|-------------------------------------|-----------------------------------|--|
| 2 miles from a 20 KT bomb explosion | 400 yds. from a HE bomb explosion | 50 yds. from a 25-pr HE shell explosion. |
|-------------------------------------|-----------------------------------|--|

Also, put a cross (X) under the one you would dislike most.

(What is required is your genuine preference, whether rational or irrational; NOT what you think you ought to prefer on logical grounds.)

7. If you were an Army Commander who required a blitz on an enemy concentration 4 miles behind their front lines, which would you prefer as the most likely to achieve your object:

- | | | |
|-------------------|---|---|
| An atomic missile | An HE bomb air attack of equivalent explosive force | Heavy Artillery bombardment of equivalent explosive force |
|-------------------|---|---|

Why?

UNDERLINE THE CORRECT ANSWERS

UNDERLINE THE CORRECT ANSWERS

8. In training troops to avoid becoming A-bomb casualties when in the open, what do you consider would be the most important "immediate action" drills in which you could exercise them?
(TWO may be marked.)

Immediately on perceiving an extremely bright light, to:

- | | | |
|-------------------------|--|---------------------------------------|
| Put on gloves. | Close their eyes. | Run for cover if within twenty yards. |
| Fall flat on the ground | Turn their backs to the light. | Cover eyes with forearm. |
| Pull muffler over face. | Suggestion for drill not mentioned above, if you have one: | |
| | | |
| | | |

9. In my opinion, nuclear weapons will make war, as an "art":

- | | | | |
|-------------------------|---------------------|--------------------------|-------------------|
| Somewhat more difficult | Much more difficult | Very much more difficult | Almost impossible |
|-------------------------|---------------------|--------------------------|-------------------|

10. What in your opinion was the value to you as an officer in actually having been in the vicinity of an atomic explosion? What did you get from it that you could not have got from a coloured sound-film and well-faked demonstrations? (Please write something between two or three sentences to two or three paragraphs).

Rank Branch if RA, Regt.
 if Cav. or Inf., etc.,

Arm of Service

INSTRUCTIONS

1. This is NOT a "Test" in the sense of being competitive as between one officer and another. The intention is to assess the amount of knowledge about nuclear warfare possessed by the average British Officer at this very moment.

2. No reports on individual officers will be made as a result of the completion of these forms. The procedure can therefore have no effect whatever on your future career. Your name and initials are not required anywhere on this form.

3. Please complete the questionnaire by underlining the answers you consider to be the correct ones. Do not underline the words "No idea" if you can make a better-than-chance guess at the right answer. If you wish to write more fully on any point, please use the inside of the plain backing sheet. All comments and opinions will be welcomed.

START HERE:

(a) There is easily available to me a copy of "Notes on Atomic Warfare", (WO Code No. 8912):

Yes.	No.	Don't know.
------	-----	-------------

(b) Also, "Supplement to Notes on Atomic Warfare", (WO Code No. 9014):

Yes.	No.	Don't know.
------	-----	-------------

(c) Have you ever seen the British coloured film "Effects of Atomic Weapons against Troops in the Field"? (C 1089):

More than once.	Only once.	Never.
-----------------	------------	--------

NOTES FOR GUIDANCE OF BUFFALO INDOCTRINEES
CONDITIONS AND REQUIREMENTS AT MARALINGA

1. The site for the Atomic Trials you are to attend is not such that the provision of creature comforts is a simple matter. It is only fair to warn you that the Camp area is endowed with neither a comfortable climate nor pleasing aspects.

Our sojourn at the Camp is for an indefinite period. If the elements are kind we may remain only a matter of days. In any event it is unlikely that our stay will exceed four weeks.

Regardless of the time we remain in the area the following information may assist in the most suitable choice of kit.

2. Site and Climate

(a) The Camp is situated in SOUTH AUSTRALIA, on the edge of the Nullabor Plain, eleven miles from WATSON. The nearest township of any size is PORT AUGUSTA (500 miles) with a population of some 7,000. Fresh water and stores are railed from PORT AUGUSTA to WATSON siding on the Trans-Australian Railway.

ADELAIDE, the capital of SOUTH AUSTRALIA, is 700 miles by rail from WATSON and approximately 600 miles by air.

(b) The site of the camp is generally flat with areas of low sand hills. Low scrub, salt bush and blue bush cover a great deal of the area with occasional scattered stands of Sheoaks. There is no grass and the surface soil breaks up easily.

(c) Conditions will vary from occasional warm days to cool to cold nights. The wind is normally strong and cold at this time of the year and upwards of an inch of rain may fall a month. The temperature range is approximately as follows:-

	<u>MAXIMUM</u>		<u>MINIMUM</u>	
	<u>Average</u>	<u>Extreme</u>	<u>Average</u>	<u>Extreme</u>
August	68	93	41	30
September	75	102	44	35

(d) Dust is a nuisance when the wind blows. Should it rain, the dust is replaced by red mud which may permanently stain clothing. It would be wise not to bring your best kit.

(e) Flies are quite numerous, even on cold days, and although the area will be sprayed we must expect some inconvenience in this regard.

3. Accommodation

(a) Messing and sleeping will be under canvas.

(b) Folding wire beds, mattresses, blankets, sheets, pillows and slips will be provided.

(c) Sufficient staff will not be available for batmen duties and with few exceptions Indoctrinees must be prepared to fend for themselves.

~~SECRET~~

4. Messing

- (a) Two Officers' Messes will be established with a bar in each. The bars, beside providing liquid refreshment, will have confectionary, cigaret requisites, etc., for sale.
- (b) All transactions will be on a cash basis.

5. Ablution and Laundering Facilities

Other than electric washing machines which should cope with our "smalls", the ablution facilities will be of a rudimentary nature, e.g. Soyer stoves and canvas showers. Unfortunately, we here still haven't devised a system better than the standard Army field latrine.

6. Amenities

- (a) Daily newspapers, periodicals and books will be available.
- (b) It is proposed to show entertainment films thrice weekly.
- (c) Chess, darts and such games will be provided.
- (d) Cricket gear and mats will be held at the Camp. (This may well afford the opportunity to settle any differences of opinion on the Tests).
- (e) Volley ball, badminton and deck tennis equipment will be on hand.

7. Issues

The issues you will receive on arriving at the Camp are as follows:-

- (a) Two towels,
- (b) Two suits of Australian Army Battle Dress,
- (c) Leather jacket,
- (d) Five blankets,
- (e) Pillow and case,
- (f) Two sheets,
- (g) Old Pattern (single breasted) greatcoat.

8. Suggested Items of Kit

- (a) A pair of boots,
- (b) Warm outer and under clothing,
- (c) Badges of rank on slides for the Australian Army Battle Dress.
- (d) Dust covers for clothing. (These will be available for purchase at the canteen).
- (e) A mirror.

Appendix F

Ref: QFO/56

(For Australian Control Group)

Army Rank

Arm or Service

1. You are requested to fill in the attached form as soon as possible after receipt, and before looking up any handbook or personal notes you may have on the subject of nuclear weapons.
2. The object of this questionnaire is to assess the knowledge about, opinions on and attitude towards nuclear weapons amongst Australian Officers as a whole at the present time, and you have been selected as one of a representative sample for this purpose.
3. Your name is quite immaterial, and it is not necessary to put it on this form. No reports on individual officers will be made as a result of completion of these questionnaires, which can therefore have no effect on you personally.
4. Please complete the questionnaire by under-lining the answers you consider to be the correct ones. Do not underline the words "No idea" if you think you can make a better-than-ohance guess at the right answer. If you wish to write more fully on any point please use the inside of the plain backing sheet. All comments and opinions will be welcomed.
5. After completion of the form, place in a sealed envelope addressed as a [REDACTED] Document and forward to AHQ (DMT). The inner envelope should be endorsed "BUFFALO".

(Signed) [REDACTED]

for
[REDACTED]

17 Sep 56

~~XXXXXXXXXX~~

Appendix G

BUFFALO TRIALS

REACTION OF IF GROUP TO THE NUCLEAR EXPLOSION

Observations by XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX

1. GENERAL

As a result of previous delays and frustrations, the group as a whole was disposed to be somewhat lighthearted and even a little cynical about the whole affair. Many had it in mind to raise a cheer, or utter some witticism, as 'Flash' was called. As the count-down approached, however, a noticeable silence descended on the assembled company and continued for some seconds after firing took place, so awe-inspiring was the spectacle.

A few officers, particularly those who had little operational experience, confessed to some nervousness both immediately before and after the explosion; but the majority must have realised that the safety precautions were such that there could be no conceivable danger and the morale effect of the weapon is extremely difficult to assess accurately from this type of indoctrination.

2. FLASH

The incredible flash was perhaps the most marked recollection of the explosion, despite the fact that it had been well portrayed in films, that indoctrinees had been well briefed on the subject, that it was a very bright sunlight afternoon and that one was facing away from the explosion. The flash completely 'took over' from the sun. Shadows, from being West to East, became North to South. Many officers were unable to distinguish clearly any objects as such, so bright was the light. The latter lasted rather longer than one expected. Everything turned a colourless white for what appeared to be rather more than a second.

3. HEAT

Considering that the Indoctrinee Force was positioned over five miles from the explosion, the heat effect experienced was remarkable. To anyone who had spoken to somebody who had attended previous tests, however, it was as one expected. It was as if someone had placed a very hot iron or an electric fire unpleasantly close to one's neck. It appeared to last about two seconds and one could readily appreciate the tremendous casualty producing effect of thermal radiation at close ranges.

4. BLAST

One could appreciate visually the large area in the neighbourhood of GZ which was affected by blast because of the clouds of dust arising at the foot of the stem of the cloud. It was therefore disappointing, especially after the briefing that one had received, to obtain virtually no effect at all at North Base. The post firing tour of the area revealed the magnitude of the blast effect but generally speaking confirmed what one had been led to expect.

5. NOISE

As with the blast, this was considerably less than one had anticipated. Films had led one to expect a vast rumble. In fact the noise was akin neither to the rumble of thunder nor to the crack of a gun being fired. It was more like the crump of a 4.2 in. mortar bomb or of a gun-cotton detonation. At five miles, both the noise and the blast (if any) took a very long time to arrive - some 26 seconds - and took most people by surprise as they were so absorbed in watching the spectacle presented by the cloud.

6. FIREBALL AND CLOUD

The fireball was considerably larger than most people expected. It resembled a vast napalm explosion, swirling angrily in the vortex. The cloud was a classic mushroom and curiously beautiful. On the whole, both behaved very much as one had come to expect from films and photographs. The turbulence and the virulence of the fireball and cloud were stupendous and there was a strange optical illusion that the cloud was making its way towards the spectators stand. Fall-out was clearly visible.

7. CONCLUSION

Although many alleged that the weapon and its destructive potential was even more horrifying than they had supposed, the majority considered that the effects and the spectacle were just about what they had been led to believe from films etc. The value of the latter on a wide distribution is therefore incalculable.

The vital moments were over so quickly that one hardly had time to absorb the effects. Most people felt that they would have liked to witness a second explosion shortly afterwards in order to see it all again. In particular, one tended to be distracted by the rockets, of which one had had insufficient warning.

The principal impressions were undoubtedly of the brilliance of the flash, the intensity of the heat, and the lack of the blast wave.

Appendix H

CHARACTERISTICS OF THE SUBJECTS

Naval and Air Force officers and civilians are placed under their equivalent Army ranks. British titles of Corps are used for Australian and New Zealand Arms and Services.

A. Indoctrinees who took QF1

1. Australians and New Zealanders

<u>Arms & Services</u>	<u>Colonels and above</u>	<u>Lt. Cols</u>	<u>Majors</u>	<u>Junior Officers</u>	<u>TOTAL</u>
Navy	-	1	6	3	10
Air Force	4	8	7	1	20
RAC	-	3	-	-	3
RA	1	5	3	-	9
RE	-	1	1	-	2
R. Sigs	-	-	2	-	2
Inf.	4	8	3	5	20
RASC	1	1	1	-	3
RAOC	-	1	-	-	1
REME	1	1	-	-	2
Other	1	-	-	-	1
TOTAL	12	29	23	9	73

2. British

RAC	-	2	9	5	16
RA	4	9	16	7	36
RE	3	3	12	6	24
R. Sigs	-	1	4	2	7
Inf.	4	12	32	12	60
RASC	-	2	2	3	7
RAMC	2	5	1	-	8
RAOC	-	-	2	-	2
REME	1	3	1	3	8
Other & Civilians	1	3	2	-	6
TOTAL	15	40	81	38	174

Appendix H (Contd)

B. Control Groups

1. Australians

<u>Arms & Services</u>	<u>Colonels & above</u>	<u>Lt.-Cols.</u>	<u>Majors</u>	<u>Junior Officers</u>	<u>TOTAL</u>
RAC	1	5	1	1	8
RA	-	4	1	-	5
RE	1	1	-	-	2
R.Sigs	-	1	-	-	1
Inf.	5	6	7	2	20
RASC	-	1	-	-	1
RAOC	-	-	1	-	1
Unknown	-	2	1	-	3
TOTAL	7	20	11	3	41

2. British

RAC	-	1	8	3	12
RA	-	4	15	6	25
RE	-	2	9	6	17
R.Sigs	-	-	3	1	4
Inf.	1	7	28	14	50
RASC	-	2	1	3	6
RAMC	1	2	1	-	4
RAOC	-	-	2	-	2
REME	-	3	-	2	5
Unknown	-	-	1	-	1
TOTAL	2	21	68	35	126

C. All Respondents

Navy	-	1	6	3	10
Air Force	4	8	7	1	20
RAC	1	11	18	9	39
RA	5	22	35	13	75
RE	4	7	22	12	45
R.Sigs	-	2	9	3	14
Inf.	14	33	70	33	150
RASC	1	6	4	6	17
RAMC	3	7	2	-	12
RAOC	-	1	5	-	6
REME	2	7	1	5	15
Remainder	2	5	4	-	11
TOTAL	36	110	183	85	414

Appendix I

Scores allocated to Answers to the

Knowledge Questions

Q#1 Question Nos.	Score of 2 marks	Score of 1 mark
1:	-	2,000 ft.
2 (Reduction):	25%	25%/20%, 20%, 25%/30%, 30%
2 (Protection):	15", 18", 15"/18"	18"/24"
3:	2,000 yds., 3,000 yds., 2,000/3,000 yds.	-
4:	-	One hour, Ten minutes, One hour/Ten minutes
5:	100%	90%, 90/100%
7:	Decreased	-
9:	Underground, Surface, Underground/Surface.	Low airburst, Underground/Low airburst, Surface/Low airburst.
10:	Fall flat on the ground.	Close their eyes. Turn their backs to the light. Cover eyes with forearm.
11:	-	Greater obstacle.

NOTES: 1. Dual answers, joined with oblique strokes above, indicate where officers underlined two adjacent answers.

2. Answers not shown above scored no marks.

Appendix J

List of Typical Statements made in Answers to
Question 10, QF 2

Order of Popularity	No. of Officers Making the Statement	% of Total Sample (=211)	Typical Statement
1	120 (77)	57% (36%)	"Seeing is believing". "There is NO substitute for the real thing". "The difference between an academic lecture (or theoretical knowledge) and a practical demonstration". (Some statement that implies the above).
2	98	46%	Troops are more interested in a lecturer who can say "I was there". Now in a position to lecture and train more convincingly and with more authority.
3	81	38%	The flash cannot be faked. It must be experienced to be appreciated - very impressive.
4	80	38%	The heat cannot be faked. It must be felt to be believed.
5	51	38% (of 136*)	Examination of the target response results was far more important than the "bang". "The vastness of the devastation". "Utter obliteration", etc.
6	27	13%	I can now put this weapon into better perspective with other weapons. I now realize both the power and the limitations of this weapon.
7	25	12%	The increased importance of heat and its speed of arrival; simultaneously with the flash. Value of heat-resistant clothing.
8	22	10%	Would like to have been much closer in properly constructed infantry position. More value if had been nearer. (Future Indoctrinees should be).
9	17	8%	Can now appreciate the sequence of events in time and space. In films you cannot appreciate these features because the scene is constantly changing and "cuts" are made in the film.
10	14	7%	Colour films and/or well-faked demonstrations are suspect.
11	12	6%	"Rather the devil you know than the devil you don't know". You fear the unknown more than the known. Seeing an explosion eliminates the fear of the unknown.
12	11	5%	Impossible to get the awe-inspiring, impressive nature of the fire-ball from films. You cannot judge its size in relation to the distance from which you are viewing it.
13	10	5%	There is a need to train more people (including other ranks) by actual experience, i.e. unit in tactical position closer to the bomb.
14	10	5%	The realisation of the terrific effect of the blast. The devastating power released.

* Only the 136 officers who completed their questionnaires after their "walkabout" of the target area could comment on this aspect.


Appendix J (Continued)

List of Typical Statements made in
Answers to Question 10, QF2 (Continued)

<u>Order of Popularity</u>	
15 & 16	<p><u>The two following statements were each made by EIGHT officers:</u></p> <p>I was impressed by the rapid decay of residual radio-activity. It is not the obstacle I expected.</p> <p>The effects of a nuclear explosion are not so severe as I expected (or ... as some think).</p>
17 & 18	<p><u>The two following statements were each made by SEVEN officers:</u></p> <p>The discussion of the effects with brother officers, and with scientists, was very valuable. Also, the lectures by scientists.</p> <p>I now realize the devastating effect on the morale of troops not expecting one, and/or not knowing WHAT to expect. Study is required on this point.</p>
19 to 23	<p><u>The five following statements were each made by SIX officers:</u></p> <p>Nearly all the value is in seeing the effects - i.e., the target response results. The actual explosion is just what I expected.</p> <p>Films cannot convey the sense of <u>power</u>; steel torn and twisted, buildings flattened, etc.</p> <p>I realize the reduced importance of gamma radiation. I am now not so worried about it.</p> <p>The results do not justify my long absence (seven weeks) from my unit, and the expense of my journey.</p> <p>This has been a stimulus to further study. It is now easier for me to learn details (distances, dosages, etc.,) and I am better able to decide <u>what</u> to learn.</p>
24 & 25	<p><u>The two following statements were each made by FIVE officers:</u></p> <p>I would be less awed by a repetition. "Familiarity breeds contempt." Able to act more quickly afterwards, and appreciate the military situation better.</p> <p>The sound effects are impossible to reproduce by films, though the flash was well faked.</p>

26 to 28	<p><u>The three following statements were each made by THREE officers:</u></p> <p>As a field commander, I should now have more confidence.</p> <p>I was shaken by the devastating effects on weapons and equipment.</p> <p>Certain features are encouraging: the efficacy of an Anderson shelter, protection by a shallow pit or reverse slopes.</p>
29 to 31	<p><u>The three following statements were each made by TWO officers:</u></p> <p>I got nothing that could not have been got from a good coloured sound film and a course of instruction.</p> <p>A demonstration <u>could</u> be laid on to give a very good impression of the effects of an atom bomb.</p> <p>Helping to lay out the targets helped me to grasp the effects.</p>
32 to 37	<p><u>The six following statements were each made by only ONE officer:</u></p> <p>There is too much opportunity for misjudgment on the basis of only one incident. Danger in generalizing therefrom.</p> <p>We should have had more value from the walkabout if we had gone much closer (to GZ).</p> <p>It would have been better if we had had more time for the walkabout and a longer inspection of the targets.</p> <p>Having seen one, I feel better able to encourage troops to stay and fight.</p> <p>I now realize how much more I have to learn, both technically and tactically.</p> <p>On no account must an atom bomb explosion be seen by ORs!</p>

N.B. All these statements were produced spontaneously, so that one made by very few officers may nevertheless be acceptable to a large number, who would have made it themselves if they had thought of it at the time.

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