



THE REPORT OF THE ROYAL COMMISSION INTO BRITISH NUCLEAR TESTS IN AUSTRALIA

CONCLUSIONS AND RECOMMENDATIONS

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THE ROYAL COMMISSION INTO BRITISH NUCLEAR TESTS IN AUSTRALIA

Conclusions and Recommendations

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Terms of Reference

By Letters Patent issued on 16 July 1984 in the following terms, the Royal Commission into British Nuclear Tests in Australia was established:

COMMONWEALTH OF AUSTRALIA

ELIZABETH THE SECOND, By the Grace of God, Queen of Australia and Her other Realms and Territories, Head of the Commonwealth:

TO

THE HONOURABLE JAMES McCLELLAND
JILL FITCH
WILLIAM JAMES ALBERT JONAS

GREETING:

WE DO by these Our Letters Patent issued in Our name by Our Governor-General of the Commonwealth of Australia on the advice of the Federal Executive Council and in pursuance of the Constitution of the Commonwealth of Australia, the Royal Commissions Act 1902 and every other enabling power, appoint you to be Commissioners to inquire, in relation to the British nuclear tests (hereinafter referred to as "the tests") that were conducted in Australia during the period of twelve years commencing on 1 January 1952, into the following matters, namely -

- (a) the measures that were taken before and at the time of the tests, and have since been taken, for the purpose of protecting persons in and about Australia and the External Territories against exposure to the harmful effects of ionising radiation and against contact with radioactive substances and other toxic materials used in or produced by the tests;
- (b) whether the measures so taken were adequate for that purpose, having regard to the measures considered appropriate for the protection of health and the standards applicable, at the time of the tests as well as at the present time: and
- (c) whether the health of persons in and about Australia and the External Territories was or has been adversely affected by reason of exposure to the harmful effects of ionising

radiation or contact with radioactive substances or other toxic materials used in or produced by the tests:

AND, without restricting the scope of your inquiry or in any way limiting the generality of the foregoing, We direct you -

- (d) to inquire particularly into the following matters, namely:
 - (i) the management and conduct of the tests including the criteria for safe firing of the tests;
 - (ii) the arrangements made both at the time of the tests and afterwards to exclude unauthorized persons from areas that in relation to the tests were prohibited areas or restricted areas for the purposes of the Defence (Special Undertakings) Act 1952 or otherwise;
 - (iii) radiological and other health physics standards and practices associated with the tests;
 - (iv) atmospheric atomic fallout monitoring arrangements associated with the tests;
 - (v) the disposal within Australia of buildings, equipment and materials that were at the test sites;
 - (vi) the measures taken, both at the time of the tests and afterwards, to manage the test sites and
- (e) in conducting your inquiry to have particular regard to the following persons, namely, members of the Australian Defence Force and civilians at the test sites, Royal Australian Navy personnel in the vicinity of the tests at Monte Bello Islands, Royal Australian Air Force personnel, including decontamination teams, involved in atomic cloud sampling and tracking operations and Aboriginals and other civilians in the general regions of the test sites:

AND, without restricting the scope of your inquiry, We further direct you, for the purposes of your inquiry, to have regard to the following documents;

- (f) the reports of the Australian Ionising Radiation Advisory Council known as No. 2 of 1975, Nos. 4 and 5 of 1979, No. 7 of 1980 and No. 9 of 1983.
- (g) the report entitled "Health of Atomic Test Personnel" prepared by the Department of Health in 1983;
- (h) Final Report on Residual Radioactive Contamination of the Maralinga Range and the Emu Site by N. Pearce (Atomic Weapons Research Establishment Report No. 0-16/68);

- (i) Report of the Expert Committee on the Review of Data on Atmospheric Fallout arising from British Nuclear Tests in Australia made to the Minister for Resources and Energy in May 1984;
- (j) British Atomic Tests in Australia Chronology of Events 1950-1968 by Dr J.L. Symonds:

AND We request you -

- (k) in respect of any particular matter that is, or becomes, in issue between the parties in proceedings in a court or before any other tribunal relating to the death or personal injury of any person alleged to arise out of the tests, to order that the evidence be taken in private if you consider that the taking of the evidence in public might directly affect the rights of a party to those proceedings; and
- (l) where any part of your report under these Our Letters Patent recites evidence the subject of an order referred to in paragraph (k), states conclusions or makes recommendations the publication of which would impinge directly on a particular matter in issue between the parties in such proceedings, to furnish that part as a separate report with a recommendation whether or not it should be published:

AND We further request you to order that evidence, being classified documents, or the contents of classified documents, of the Government of the United Kingdom, be taken in private unless that Government consents to the taking of that evidence in public and, where any part of your report under these Our Letters Patent contains such classified documents or recites the contents of such documents and that Government has not consented to publication of that part, to furnish that part as a separate report with a recommendation whether or not it should be published;

AND We appoint you the Honourable James McClelland to be the President of the said Commissioners:

AND We further direct that, for the purpose of taking evidence, two Commissioners, one of whom shall be the President, shall be sufficient to constitute a quorum and may proceed with the inquiry under these Our Letters Patent:

AND We declare that in these Our Letters Patent -

- (m) the expression "British nuclear tests" includes the tests associated with the British nuclear tests known as the minor trials and the experimental programme; and
- (n) the expression "test sites" means the sites of the British nuclear tests:

AND We further direct you to make such recommendations arising out of your inquiry as you think appropriate, including recommendations regarding the future management and use of the test sites:

AND We require you as expeditiously and on as informal a basis as possible to make your inquiry and, not later than 30 June 1985 or such later date as We may be pleased to fix, to furnish to

Our Governor-General of the Commonwealth of Australia a report of the results of your inquiry and your recommendations.

WITNESS His Excellency the
Right Honourable Sir
Ninian Martin Stephen, a
member of Her Majesty's Most
Honourable Privy Council,
Knight of the Order of
Australia, Knight Grand Cross
of the Most Distinguished
Order of Saint Michael and
Saint George, Knight Grand
Cross of The Royal Victorian
Order, Knight Commander of The
Most Excellent Order of the
British Empire, Knight of the
Most Venerable Order of the
Hospital of Saint John of
Jerusalem, Governor-General of
the Commonwealth of Australia
and Commander-in-Chief of the
Defence Force

Dated this sixteenth day
of July 1984.

N. M. STEPHEN

Governor-General

By His Excellency's Command,

LIONEL BOWEN

Minister of State for Trade
for and on behalf of the
Prime Minister

1.1.2 The date for the return of the Letters Patent was extended, on 27 June 1985, to 30 September 1985 and again on 9 August, this time to 20 November 1985.

Conclusions

1. The Royal Commission received no evidence to disturb the overwhelming impression that the original decision to lend Australia to the United Kingdom for the purpose of the latter's nuclear tests program was taken by Australian Prime Minister Menzies without reference to his Cabinet. (2.1.34 and 12.1.15)
2. The decision was taken without the benefit of any scientific knowledge of the hazards that would be involved. (12.1.15)
3. There is no documentation to suggest that Menzies was informed of the long-term program that the British had in mind once they abandoned the United States as a possible site for their first test, but it is likely that he was given at least a broad outline. (12.1.15)
4. The Australian Government willingly accepted the British view that, by the terms of its agreement with the US, the UK was prevented from providing information on, or allowing Australian participation in, technical aspects of the tests. (12.3.17)
5. At the Hurricane trial Australian scientists did not have sufficient information to advise the Australian Government whether the weapon could be fired in conditions which would represent no hazard to the Australian mainland. (12.3.62)
6. The Australian Government was placed in a position where it was forced to accept UK assurances on the safety aspects of the test without any critical examination by its own scientists. (12.3.62)
7. There was virtually complete government control of the Australian media reporting of the Hurricane test and the lead-up to it, thus ensuring that the Australian news media reported only what the UK Government wished. (12.3.77)
8. There was no opportunity for the Australian public to have an understanding of the nature of the Hurricane test and so make any critical analysis of the conduct of it. This was to be a recurrent theme throughout the entire weapons testing program. (12.3.77)
9. The decision to use the mainland for atomic tests was made without specific consideration by Australian scientists or others of whether weapons could be safely fired. Consideration was limited to the fact that Emu was a remote location. (12.4.38)

10. The Australian Government's agreement to make the mainland available was given with no independent advice or analysis and little consideration and consultation. (12.4.38)
11. Federal Cabinet was not informed, neither were the Parliament nor the Australian news media, until the preparation of the Emu site was well under way. (12.4.38)
12. There was no official approach to the Australian Government before Totem for approval for a long-term testing program although the UK's plans were well developed. (12.4.38)
13. Information available to the Australian scientists on the movement and location of people in the vicinity of Emu was inadequate. (12.4.39)
14. A formal power of veto was not available to the Australian observers for Totem as was to be the case in later tests. (12.4.39)
15. Bearing in mind that the yield given in the planning document was about half that of the actual Totem explosions, the categorical and all-embracing nature of the assurance of safety given by Martin and Titterton gave legitimacy to the Australian Government's decision to allow the tests to take place. (12.4.39)
16. Although limited access to the Emu site was given, the media was provided with almost no indication of any hazard which might arise for the Australian population. (12.4.39)
17. The Australian Government had no intention of testing public reaction before deciding to agree to provide a permanent proving ground at Maralinga; no announcement was allowed until there was a formal commitment. (12.5.17)
18. The Australian Government had reached the firm view that, so far as British security considerations would allow, Australian scientists should be fully informed and involved in all decisions to fire atomic weapons at Maralinga. (12.5.17)
19. The establishment of the Atomic Weapons Tests Safety Committee (AWTSC) was an important, albeit tardy, step in providing the Australian Government with the opportunity to obtain independent scientific advice on the safety aspects of the tests. (12.6.18)
20. Membership of the AWTSC, a committee established by the Australian Government and comprising Australians, was vetted by UK authorities. (12.6.18)
21. The Australian Prime Minister's stated requirements for the members of the AWTSC not to have any conflict of interests in relation to the success of the atomic weapons tests program was not met with respect to Titterton. (12.6.18)

22. Agreement in principle by the Australian Government for the British to use the Monte Bello Islands for tests of the size envisaged for Mosaic and at the time of the year proposed was given with the knowledge that the occurrence of suitable weather conditions would be unlikely. (12.7.55)

23. Although the AWTSC was established by the time of Mosaic and had an effective power of veto, it was not provided with sufficient information to discharge its function properly for the Mosaic tests. (12.7.55)

24. Information on Mosaic provided to the Australian news media and to the public was largely limited to generalised assurances on safety. Only when things appeared to be going wrong was more information provided. (12.7.55)

25. The AWTSC was provided with adequate information and was able properly to advise the Government about the safety of the proposed Buffalo tests. (12.8.36)

26. The Australian Government had sufficient information to make an informed decision as to the criteria for safe firing for the Buffalo tests. (12.8.36)

27. Significantly greater attempts were made to inform the public about the Buffalo testing program with a view to allaying public concerns about safety. The public was not, however, informed of the true nature of the hazards involved. (12.8.36)

28. The AWTSC was provided with adequate information and was able properly to advise the Government about the safety of the proposed Antler tests. (12.9.33)

29. The Australian Government had sufficient information to make an informed decision as to the criteria for safe firing for the Antler tests. (12.9.33)

30. The process of allaying public concern about the testing program continued throughout the Antler series but the public was again not informed of the true nature of the hazards involved. (12.9.33)

31. Efforts were made throughout the major tests by the United Kingdom and Australian Governments, with the assistance of scientists, to persuade the Australian public that the tests were both necessary and safe. These efforts were increased when it became apparent that the majority of people were opposed to the continuation of the tests. (12.10.102)

32. The first series of Kittens trials, conducted at Emu in 1953, was carried out without formal Australian Government approval and without advice being provided to the Australian Government by either Australian or UK scientists. (12.10.101)

33. The 1955 Kittens and Tims trials at Maralinga were conducted after approval from the Australian Government based upon properly considered advice from Australian scientists. (12.10.101)

34. Official Government comment on the 1955 series of minor trials, as with so many other statements concerning the test program, appeared to be designed either to exaggerate the extent of Government to Government co-operation or to escape from an awkward situation rather than genuinely to provide information to the public. (12.10.101)

35. By 1956, procedures were in place to allow the AWTSC an opportunity to examine the proposed program of minor trials for the forthcoming year and to report to the Government through the Minister for Supply on safety aspects. It is unclear, however, what arrangements were adopted for considering late variations. (12.10.101)

36. The 1957 program of minor trials was submitted for consideration by the Government and the decision to approve it was taken at the Cabinet level. It is not clear what advice was provided on safety aspects. (12.10.101)

37. The 1958 series of minor trials was approved by the Australian Government on the basis of information submitted to the AWTSC. (12.10.101)

38. The Royal Commission considers that Titterton recommended to the Minister for Supply that the 1959 series of minor trials be approved by the Prime Minister, without prior consultation with the AWTSC. (12.10.101)

39. Through his direct channel of communication with Titterton, Penney sought advice on the best way of gaining approval for the Vixen A extension of the 1959 series, including the burning of plutonium. (12.10.101)

40. The long-term consequences of the use of plutonium in the Vixen A tests in 1959 were not considered in terms of safety hazards on the Range. (12.10.101)

41. The 1960 proposal for assessment tests, which included the Vixen B tests, caused Australian officials, particularly in the Department of Defence, to question the existing procedures for approval of the program. It was apparent that decisions which demanded political input were being taken by the AWTSC, through its Chairman, without reference to appropriate Ministers. Appropriate solutions to this dilemma were eventually found by creating a channel of communications to the Minister for Defence. (12.10.101)

42. During discussions on the 1960 program between Titterton and the UK authorities, the Vixen B tests were misrepresented as having zero fission yield in all cases. (12.10.101)

43. By the time of the 1961 program, more satisfactory information was obtained, enabling a more informed decision to be made by Ministers. (12.10.101)

44. The continuing furore surrounding the Vixen B proposals forced the UK to provide sufficient details to the Australian Government. Informed approval was given to a 1962 program even though this program did not take place. (12.10.101)

45. By 1963, the procedures for approval of minor trials had become more elaborate and formalised. More departments became involved, more people needed to be satisfied and inevitably, more information was disseminated. As Titterton's role diminished, the cosy and unsatisfactory atmosphere of 'mutual trust' diminished, and the flow of information was increased. (12.10.101)

46. The atmosphere of mutual trust between the watchers and the watched was altogether unsatisfactory and dangerous. The watchers who, after all, had the power to prevent the tests should have been considerably harder to convince and should have required much more than assurances from the British before granting approval. (12.10.101)

47. The AWTSC failed to carry out many of its tasks in a proper manner. At times it was deceitful and allowed unsafe firing to occur. It deviated from its charter by assuming responsibilities which properly belonged to the Australian Government. (12.10.102)

48. Titterton played a political as well as a safety role in the testing program, especially in the minor trials. He was prepared to conceal information from the Australian Government and his fellow Committee members if he believed to do so would suit the interests of the United Kingdom Government and the testing program. (12.10.102)

49. The fact that the AWTSC did not negotiate with the UK openly and independently in relation to the minor trials was a result of the special relationship which enabled Titterton to deal with the Atomic Weapons Research Establishment (AWRE) in a personal and informal manner. He was from first to last, 'their man' and the concerns which were ultimately voiced in relation to the Vixen B proposals and which forced the introduction of more formal procedures for approving minor trials were a direct result of the perceived inadequacies in the manner in which he had carried out his tasks. (12.10.102)

Radiation Protection Standards

50. The international radiation protection recommendations agreed to by the ICRP in 1950 were based on a belief that for all radiation effects except genetic or heritable effects, there were threshold doses for different effects and different types of radiation below which the various effects would not be observed. The values of these threshold doses were however uncertain, and this uncertainty led to a strong recommendation 'that every effort be made to reduce exposures to all types of ionising radiations to the lowest possible level'. Genetic effects were considered unimportant at the maximum permissible dose levels which were recommended. (4.2.112)

51. The policy on exposure to radiation laid down for participants in all the major trials, the code of practice for application of the policy, and the maximum radiation doses specified, were reasonable and compatible with the international recommendations applicable at the time. (4.2.112)

52. There were departures, some serious and some minor, from compliance with the prescribed radiation protection policy and standards during the test program. (4.2.112)

53. The measures taken before and at the time of the tests for protecting persons against exposure to the harmful effects of radiation, based as they were on the concept that any dose below a certain level was 'safe', must be regarded as inadequate in the light of radiation protection standards at the present time. (4.2.112)

54. The international radiation protection recommendations adopted by the ICRP in 1954 were essentially unchanged from those of 1950. They were still based on a belief in a 'threshold dose' for all but genetic effects of radiation. (4.2.112)

55. A limit of maximum permissible exposure for individual members of the public was agreed by the ICRP in 1956 and published in 1957. The limit was to be ten per cent of the corresponding occupational limit, that is 500 mrem per year for whole-body exposure to penetrating radiation. (4.2.112)

56. In 1958, the ICRP first stated clearly that there are two types of radiation effects against which protection is required; these are now known as stochastic and non-stochastic effects. (4.2.112)

57. In 1958, the concept of a permissible weekly dose was dropped, on the basis that it was the total accumulated dose which was important (provided that it was made up of sufficiently small doses). The dose limits were set for a period of one year (subject to a further limit over a 13 week period). In effect the new limit was one third of the earlier (1950 and 1954) values. (4.2.112)

58. By 1965, the ICRP definitely based its radiation protection recommendations on the assumption that any exposure may involve some risk. It recommended that any unnecessary exposure be avoided, and that all doses be kept as low as is readily achievable, economic and social considerations being taken into account. (4.3.14)

59. Current radiation protection standards in most countries including Australia and the United Kingdom are based on the 1977 recommendations of ICRP, which depend on a 3-part 'system of dose limitation', which may be summarised as follows:

- (i) all exposures must be justified;
- (ii) once justified, all exposures must be kept as low as reasonably achievable, economic and social factors being taken into account; and
- (iii) the dose to any individual may not exceed the appropriate limit specified by the ICRP. (4.5.36)

60. The annual dose limit for occupational exposure which ICRP considers to provide an acceptable average risk of stochastic effects is 50 mSv (5 rem), and is essentially unchanged since 1958. Dose limits of 50 mSv per year should prevent non-stochastic effects in all organs of the body except the lens of the eye, for which the limit is 15 mSv per year. (4.5.36)

61. 'Planned special exposures' where workers may exceed the dose limits are permitted in certain circumstances, provided that the dose received does not exceed twice the relevant annual limit in a single event, or five times this limit in a lifetime. (4.5.36)

62. Medical examinations cannot confirm that exposure has been below the recommended annual limit. They are, however, useful to monitor the workers' general state of health. Any illness, disease or abnormality detected cannot be unequivocally associated with radiation exposure, except possibly in a case of exposure well above the dose limit. (4.5.36)

63. For individual members of the public, the ICRP considers that an acceptable risk of stochastic effects will be provided if their average dose per year of life-long exposure is limited to 1 mSv (100 mrem). This is not to be regarded as an absolute limit for any one year, but as a yearly average over a lifetime. A subsidiary limit of 5 mSv (500 mrem) per year may be used where exposure is of short duration, and this limit is unchanged since 1956. Non-stochastic effects should be prevented by limiting the dose in any organ to 50 mSv (5 rem) per year. (4.5.36)

64. Assuming a linear, no-threshold relationship between the frequency of stochastic effects and dose, it is possible to use available epidemiological data to derive risk estimates for stochastic effects at low doses. These risk estimates may be used, together with estimates of collective dose to a population, to derive estimates of the total number of stochastic effects which might be expected to occur in that population. Such estimates are very imprecise but may be useful in some circumstances. They may give an indication of the order of magnitude of the number of stochastic effects to be expected to result from a particular practice which exposes a population to radiation. (4.5.36)

65. Exposure to radiation at certain dose levels is associated with increased risk of stochastic effects such as cancer and genetic or heritable effects. At low dose levels where there are no data on human populations, it is assumed that exposure is associated with correspondingly low increased risk of stochastic effects. (4.6.20)

66. The exact form of the dose-response relationship at low doses is uncertain. A linear relationship has been assumed in setting radiation protection standards because it is considered the most conservative of all the likely relationships, i.e. if anything, it will over-estimate the risk. (4.6.20)

67. Research has not indicated any increased risk of mortality from conditions other than malignant disease in irradiated human populations. (4.6.20)

68. Increased frequency of genetic or heritable effects has not been demonstrated in any irradiated human population, although it is accepted that such effects do occur. (4.6.20)

69. Heritable effects and cancers caused by radiation are not distinguishable from those arising from other causes. (4.6.20)

70. Non-stochastic effects of irradiation such as temporary or permanent sterility and cataract of the lens of the eye result from damage to a substantial number of cells. There are threshold doses below which such effects have not been observed. (4.7.30)

71. Of several modifying factors known to be capable of affecting radiation response, only age at irradiation appears at present to be of practical importance in radiation protection. (4.7.30)

72. Although the radiation protection recommendations issued by the ICRP since 1950 may sometimes lack clarity, the evidence does not enable the Royal Commission to conclude whether or not the standards set by the ICRP have been affected by the involvement of some of its members in the nuclear industry. (4.8.5)

73. By reason of the detonation of the major trials and the deposition of fallout across Australia, it is probable that cancers which would not otherwise have occurred have been caused in the Australian population. (4.9.22)

74. Their exposure to radiation as participants in the trial program has increased the risk of cancer among 'nuclear veterans'. (4.9.22)

75. The Royal Commission has been unable to quantify the probable increase in the risk of cancer among the participants in the trial program or among the Australian population in general. (4.9.22)

The Hurricane Test

76. The Monte Bello Islands were not an appropriate place for atomic tests owing to the prevailing weather patterns and the limited opportunities for safe firing. (5.1.4)

77. There was fallout on the mainland following Hurricane, although most of the activity fell in the sea to the north and west, as was intended. The fallout probably did not begin falling on the mainland until 30 hours after the burst. Hence it is unlikely that the fallout exceeded the no-risk level proposed in the report prepared prior to the test. (5.3.12)

78. There was a failure at the Hurricane trial to consider the distinctive lifestyles of Aboriginal people. As no record was made of any contamination of the mainland it is impossible to determine whether Aborigines were exposed to any significant short or long-term hazards. (5.4.14)

79. Despite the acknowledgement by Air Vice Marshal Davis that the RAAF Lincolns which flew the cloud sampling sorties at Hurricane could be contaminated, there were no procedures to check and if necessary decontaminate the aircraft. (11.1.42)

80. The quick action taken to decontaminate HMAS Koala following the salvage of the LCA is evidence of the concern to ensure that appropriate radiation protection procedures were instituted promptly after an unplanned incident. (5.5.57)

81. Aircrew of the Lincoln aircraft at Hurricane should have been supplied with radiation monitoring devices and given instructions as to their behaviour when in the cloud or a contaminated aircraft. The failure to provide this equipment and instructions was negligent. Ground crew should have been similarly equipped and instructed. (5.5.57)

82. Air and ground crew of Lincoln aircraft used for Hurricane suffered exposure to radiation but the dose which they

received is now impossible to determine accurately. It is unlikely that the dose exceeded the level of dose which others involved in the program were authorised to receive. (5.5.57)

83. The failure to make provision for personal monitoring of air and ground crews was an omission which fortuitously did not result in exposure of those personnel to high levels of radioactivity. The RAAF should have been informed of the risks and provided with equipment to monitor the crews. (5.5.57)

84. The Royal Commission finds convincing the recurring evidence given by servicemen who were at the Hurricane test in positions close to the site of the explosion that after a person had entered an active area decontamination procedures were tediously and thoroughly carried out. (5.5.57)

85. The divers involved in the recovery of the landing craft and also in the recovery of moorings after the explosion were exposed to the risk of ingesting contaminated sea water in the performance of their duties. (5.5.57)

86. The evidence from servicemen aboard the RN and RAN vessels does not disclose breaches of health and safety regulations which allowed those personnel to be exposed to radiation beyond the limits set at the time. (5.5.57)

The Totem Tests

87. The Totem 1 test was fired under wind conditions that the study in Report A32 had shown would produce unacceptable levels of fallout. Measured fallout from Totem 1 on inhabited regions did exceed the limits proposed in Report A32. (6.2.19)

88. The firing criteria used for the Totem 1 test ignored some of the recommendations of Report A32 and did not take into account the existence of people at Wallatina and Welbourn Hill down-wind of the test site. (6.2.19)

89. The weather conditions at the time of firing Totem 2 satisfied the criteria for firing. (6.2.19)

90. There was a failure at the Totem trials to consider adequately the distinctive lifestyle of Aborigines and, as a consequence, their special vulnerability to radioactive fallout. (6.3.65)

91. Inadequate resources were allocated to guaranteeing the safety of Aborigines during the Totem nuclear tests. (6.3.65)

92. The Native Patrol Officer had the impossible task of locating and warning Aborigines, some of whom lived in traditional lifestyles and were scattered over more than 100 000 square kilometres. (6.3.65)

93. The closure of Ooldea Mission was not directly related to the nuclear tests. However, relocating people at Yalata and preventing them from returning to Ooldea and places further north marked the beginning of a period during which Aboriginal people were denied access to their traditional lands. (6.3.65)

94. The differences in the details of Aboriginal accounts of the Black Mist are to be expected after the passage of over thirty years. The accounts are sufficiently consistent in general for them to have credibility. (6.4.92)

95. An oral history of the Black Mist existed for many years before the incident became known to the general public. (6.4.92)

96. Meteorological, mathematical and statistical modelling indicates that a black mist passing over Wallatinna and Welbourn Hill could have happened. (6.4.92)

97. There is no reason to disbelieve Aboriginal accounts that the Black Mist occurred and that it made some people sick. Both radiation exposure and fear can lead to vomiting. At Wallatinna, the vomiting by Aborigines may have resulted from radiation, it may have been a psychogenic reaction to a frightening experience, or it may have resulted from both of these. (6.4.92)

98. The Royal Commission believes that Aboriginal people experienced radioactive fallout from Totem 1 in the form of a black mist or cloud at and near Wallatinna. This may have made some people temporarily ill. The Royal Commission does not have sufficient evidence to say whether or not it caused other illnesses or injuries. (6.4.92)

99. Given the historical uncertainties and the current state of scientific knowledge, the evidence presented does not enable the Royal Commission to decide one way or the other whether the Black Mist caused or contributed to the blindness of Yami Lester. (6.4.92)

100. Radiological safety procedures at Emu, including decontamination, were well planned and executed. The Royal Commission cannot exclude the possibility that some unplanned incidents occurred, including the loosening or removal of respirators by participants in the forward areas. (6.5.158)

101. The aircrews for Operation Totem should have been included in the general radiological safety planning for Operation Totem. (6.5.158)

102. It was negligent to allow aircrew to fly through the Totem 1 cloud without proper instructions and without protective clothing. (6.5.158)

103. Aircrew of the Lincoln aircraft at Totem 1 should have been supplied with radiation monitoring devices and given instructions as to the behaviour of these devices when in the cloud or a contaminated aircraft. The failure to provide this equipment and instructions was negligent. Ground crew should have been similarly equipped and instructed. (6.5.158)

104. Air and ground crew of Lincoln aircraft used for Totem 1 suffered exposure to radiation but the doses which they received are now impossible to determine accurately. It is unlikely that the doses exceeded the level of dose which others involved in the program were authorised to receive. (6.5.158)

105. There was lack of foresight shown in the failure to institute a proper system of decontamination for RAAF aircraft at Woomera before the Totem 1 detonation. (6.5.158)

106. Procedures to deal with the RAAF cloud sampling aircraft at Totem were nonexistent prior to the Operation. This was a serious omission because a number of the aircraft were contaminated with significant levels of radioactivity. Procedures had to be improvised until a decontamination centre was set up at Amberley. (11.1.42)

107. Measures to control the radiation and ingestion risk to personnel working in the decontamination centre at Amberley were generally adequate. (11.1.42)

108. Those crew members who travelled with the Centurion tank on its journey from Emu to Puckapunyal were subject to radiation exposure. No crew members wore film badges for any part of the journey, and the Royal Commission is therefore unable to determine the level of exposure for any members of the crew. (6.5.158)

109. There is no evidence to support allegations of an emergency evacuation of Emu after the Totem series. Stores which remained at Emu were low priority items not required in the UK or at Woomera. (6.5.158)

The Mosaic Tests

110. The Monte Bello Islands were not a suitable site for the Mosaic tests G1 and G2 because the chances of obtaining suitable occasions to fire were too low. (7.1.7)

111. The Mosaic tests were conducted in a hurry under marginal meteorological conditions. (7.3.46)

112. The theoretical predictions were incorrect for both Mosaic tests and parts of the clouds passed over the mainland of Australia. (7.4.47)

113. Although the close-in fallout from both Mosaic tests fell into the ocean, fallout also occurred over the mainland and some of it originated from parts of the main clouds. The AWTSC's communications with the Minister for Supply soon after the second explosion, when it reported that the cloud had not crossed the coast, with the implication that there was no fallout on the mainland, were misleading. (7.4.47)

114. The level of fallout on the mainland was less than the Level A criterion defined before the Mosaic tests and was also less than the Level A' criterion used at the Buffalo trials for areas in which nomadic Aborigines were living. Although the fallout at Port Hedland satisfied the standards of the time, it did exceed the dose levels applicable later for members of the general public. It was less, however, than the level allowed for occupationally exposed workers. (7.4.47)

115. The AWTSC report to the Prime Minister following the Mosaic tests was misleading and did not properly inform the Government of the difficulties experienced with meeting the firing criteria, the unexpected winds that brought some of the stem and cloud over the mainland and the higher than expected levels of fallout on the mainland. (7.4.47)

116. For the Chairman of the AWTSC to advise the Minister for Supply that conditions for firing G2 were ideal from the point of view of safety of the mainland was grossly misleading and irresponsible. (7.4.47)

117. The presence of Aborigines on the mainland near the Monte Bello Islands and their extra vulnerability to the effect of fallout was not recognised by either AWRE or the Safety Committee. It was a major oversight that the question of acceptable dose levels for Aborigines was recognised as a problem at Maralinga but was ignored in setting the fallout criteria for the Mosaic tests. (7.5.12)

118. The Royal Commission concludes that the precautions taken for the health and safety of the servicemen at Mosaic were generally adequate. (7.6.55)

119. It is the Royal Commission's view that all efforts were taken to limit radiation exposure of the crew of HMS Diana from fallout. Those below decks would have received only minimal or background levels of radiation, and those above decks and exposed to fallout were wearing protective clothing and film badges and had their doses recorded. (7.6.55)

The Buffalo Tests

120. Buffalo round 1 (One Tree) was fired at a time when the fallout was predicted to violate the firing conditions that had been proposed by the AWTSC and agreed to by the Government. Measurements after Buffalo round 1 confirmed that fallout exceeded Level A at locations beyond Coober Pedy and exceeded the Level B for nomadic people where Aborigines could be expected to be living. (8.3.29)

121. Round 2 (Marcoo) was fired in conditions which violated the firing criterion that there should be no forecast of rain except in areas remote (interpreted as 500 miles) from Ground Zero. Rain was forecast within 250 miles and actually fell within 100 miles of Ground Zero. (8.3.29)

122. Round 3 (Kite) was fired under conditions which led to contamination of Maralinga Village. Although, in the event, the contamination was minor, the round should not have been fired under the conditions prevailing at the time. (8.3.29)

123. Round 4 (Breakaway) was fired under conditions for which the fallout was predicted to exceed Level A beyond a distance of 100 miles and into the inhabited region. In addition, the condition that there should be no overlap of fallout exceeding the Level A at distances more than 100 miles from the site was violated. (8.3.29)

124. Overall, the attempts to ensure Aboriginal safety during the Buffalo series demonstrate ignorance, incompetence and cynicism on the part of those responsible for that safety. The inescapable conclusion is that if Aborigines were not injured or killed as a result of the explosions, this was a matter of luck rather than adequate organisation, management and resources allocated to ensuring safety. (8.4.101)

125. For the Buffalo tests a site was chosen on the false assumption that the area was not used by its traditional Aboriginal owners. Aborigines continued to move around and through the Prohibited Zone and inadequate resources were allocated to locating them and to ensuring their safety. The reporting of sightings of Aboriginal people was discouraged and ignored. (8.4.101)

126. Aboriginal people were kept away from Ooldea and other important places to the south and west of the Maralinga Range. At the same time, the construction of the Giles meteorological station and roads brought intruders and detrimental effects to the people north-west of Maralinga. (8.4.101)

127. Native Patrol Officer MacDougall was placed in an impossible situation. In his task of ensuring Aboriginal safety he had to carry two totally inexperienced colleagues. The

appointment of one of these can only be described as blatantly cynical. MacDougall's considerations of Aboriginal welfare brought him increasingly into conflict with authorities in government and WRE. The affairs of a handful of natives counted little compared to the interests of the British Commonwealth of Nations. (8.4.101)

128. The Pom Pom incident demonstrated that flaws existed in the security system at Maralinga. Those responsible for security seemed at least as concerned about the exposure of such flaws as the welfare of the Milpuddie family. (8.4.101)

129. For the Milpuddies the experience caused great concern and it distresses Edie Milpuddie today. The Royal Commission cannot exclude the possibility that the Milpuddies' entry into the contaminated area resulted in injury to them. (8.4.101)

130. Radiological and physical safety arrangements for participants during the Buffalo tests were well planned and sound. Security was strictly policed during the major tests but was relaxed afterwards. Unplanned incidents and exposures may have occurred during this time. Breaches of the safety regulations may also have occurred when participants loosened or discarded respirators. (8.5.116)

131. There are no recorded cases of participants receiving doses above the higher integrated dose set down in the Radiological Safety Regulations for the Buffalo nuclear tests. The Royal Commission acknowledges that the existing records of radiation doses may be incomplete and inaccurate. (8.5.116)

132. Operation of the 'need to know' principle and the minimal amount of information given to participants has been a factor contributing to participants' concerns and fears regarding what might have resulted from their experiences at Maralinga. Nevertheless, such participation at the tests, including residence in the village during the Kite explosion, has increased the risk of cancer to those participants who were exposed to radiation but the Royal Commission has been unable to quantify the probable increase. (8.5.116)

133. The Royal Commission rejects the allegation that mentally defective people were used in nuclear experiments at the Buffalo tests. (8.5.116)

The Antler Tests

134. The Australian Government made no decision on the permitted level of contamination from fallout of the Antler explosions. (9.1.36)

135. Although the National Radiation Advisory Committee (NRAC) approved permitted levels of dose resulting from fallout, it was left to the AWTSC to determine the level of contamination which would give those doses. (9.1.36)

136. It appears that the contamination levels accepted by the Safety Committee met the external gamma dose limit approved by NRAC. The criteria adopted for the Antler tests allowed about double the contamination levels approved by the Government for the Buffalo series the year before. (9.1.36)

137. For rounds 1 and 2 of Antler, the measured contamination from fallout satisfied the criteria set by the Safety Committee. For round 3 the fallout at the edge of the 'inhabited' zone exceeded the limit of a total gamma dose of 500 mr. (9.2.33)

138. The extent of the fallout was predicted reasonably well for the two tower bursts (rounds 1 and 2), but the intermediate distance fallout from the air burst (round 3) was seriously underestimated. (9.2.33)

139. There was no overlap of the fallout patterns beyond a distance of 35 miles from each Ground Zero. (9.2.33)

140. Inadequate attention was paid to Aboriginal safety during the Antler series. People continued to inhabit the Prohibited Zone as close to the test sites as 130 km. (9.3.55)

141. Air and ground patrols for Antler were neither well planned nor well executed. (9.3.55)

140. Aboriginal people continued to inhabit the Prohibited Zone for six years after the tests. When they were told to leave the Prohibited Zone, some of them perished. (9.3.55)

142. The Antler series of tests was clearly better planned, organised and documented than any of the previous test series. Nevertheless, it was not entirely without unplanned incident. (9.4.28)

143. The procedures adopted for the decontamination of aircraft at Mosaic, Buffalo and Antler were based on experience gained at Hurricane and Totem and were, for the most part, well developed and managed. (11.1.42)

144. The weapon exploded at Tadge had associated with it cobalt-60 to be used as a tracer. The technique used proved to be unsuccessful and the resultant dispersal of the active pellets was only discovered accidentally many months after the explosion. (9.5.16)

145. The Australian Health Physics Representative (AHPR) and those personnel who helped collect the pellets for subsequent disposal were exposed to radiation as a result. (9.5.16)

146. The British scientists should, as had been agreed, have informed the AHPR of the existence of the pellets, before they left the Range at the end of the Antler series. By their failure to do so, an unnecessary radiation hazard was created. (9.5.16)

147. The Royal Commission believes that Titterton was the only member of the AWTSC who knew of the use of cobalt-60 at the time of the Tadge test. In not informing other members of the AWTSC and the AHPR, he also contributed to an unnecessary radiation hazard. (9.5.16)

General

148. The balloon incidents demonstrate the inadequacy of the safety precautions governing the use of balloons at Maralinga. The fact that the incidents occurred and that the bureaucrats, scientists and politicians were prepared to give categorical assurances that they could not occur, casts doubt on other assurances given to the public at the time. (11.2.16)

149. In the light of all the evidence the Royal Commission does not accept that a number of dead Aborigines were found at Maralinga as alleged by Mr Connolly. (11.3.15)

150. The Royal Commission concluded that there was no reason to disbelieve Mr Earner's statement about his burning of what he believed were bombs at Woomera, but it is clear that whatever was burnt contained no radioactive material. (11.4.6)

151. None of Marston's results on the levels of iodine-131 in thyroids was suppressed. However, the AWRE and the AWTSC insisted that two figures giving the gamma spectra of fallout at Adelaide be deleted. Marston readily agreed to these deletions. (11.5.19)

152. Marston and the AWTSC strongly disagreed on the health effects of the nuclear tests and this resulted in a public dispute since the AWTSC tried to answer Marston's criticisms in the scientific literature. The AWTSC was very high-handed in its treatment of Marston's paper. In contrast, Penney did not seem to object to Marston's speculation, once Marston had removed the two diagrams which inadvertently contained bomb design information. (11.5.19)

153. The Royal Commission cannot exclude the possibility that those persons employed as Peace Officer Guards and security personnel at Emu and Maralinga may have been subjected to increased risk from exposure to radiation. (11.6.9)

The Minor Trials

154. In view of the known long half-life of plutonium (24 000 years), the Vixen series of minor trials should never have been conducted at Maralinga. (10.2.66)

Clean-up of the Ranges

155. The AWTSC was wrong to assume that long-term or permanent habitation of contaminated areas was improbable even in the distant future. (13.1.36)

156. The Australian Government failed to set adequate policy guidelines or give adequate direction to the AWTSC regarding future plans for the Maralinga Range. (13.1.36)

157. Operation Brumby was based on wrong assumptions. It was planned in haste to meet political deadlines and, in some cases, the tasks undertaken made the ultimate clean-up of the Range more difficult. (13.2.34)

158. The decision to render the Range anonymous was inappropriate. The idea that if people could not find the site it was permissible to leave it in a more hazardous state is not acceptable. (13.2.34)

159. The operation of ploughing and disc-harrowing was the wrong procedure to control the radiological hazard in the plutonium-contaminated areas at Taranaki, TM400, TM101 and Wewak. The AWRE and AWTSC should have given the problem more thought before they implemented a program of dispersing the plutonium into the soil. (13.2.34)

160. Neither the AWRE nor the AWTSC was aware of the presence of the large numbers of plutonium-contaminated fragments at Taranaki, TM100, TM101, and Wewak. The data collected during operation Radsur were suggestive of the contaminated fragments and AWRE should have investigated the anomalously high readings. (13.2.34)

161. It would not have been realistic to have expected Moroney or the AWTSC to interpret the information they received from AWRE about Radsur as meaning that there were large numbers of plutonium-contaminated fragments. It is clear that Pearce himself did not have this understanding when he sent the information. (13.2.34)

162. The UK personnel were in a much better position than the Australians to realise that there were large numbers of plutonium-contaminated fragments, and to appreciate the associated hazard. The Australians were only given a general

idea of what was happening at the trials and were not allowed to be present at any time when a minor trials program was in progress. On the other hand, the UK personnel knew precisely what was going on and the likely dispersal of material. They were also present shortly after the explosions and were in a position to observe the extensive distribution of fragments. (13.2.34)

163. The treatment of the plutonium-contaminated areas during Operation Brumby was inadequate, based on the wrong assumptions, and left the areas in a more difficult state for any proper future clean-up. (13.2.34)

164. The discovery of the large number of plutonium-contaminated fragments on the Maralinga Range changed the hazards that had to be considered in any discussion of the future uses of the Range. Although it would have been better if the fragments had been discovered earlier, it was only with the development of stable portable instruments that reliable field measurements could be undertaken. Furthermore, the amount of americium-241 which was used as an indicator of plutonium has been steadily building up in concentration making it easier to detect. It was not until the recent Australian Radiation Laboratory (ARL) survey that enough effort and appropriate equipment were put into surveying the contamination at Maralinga to allow a proper assessment of the state of the Range. (13.5.16)

165. The surveillance and control of the Monte Bello Islands have been inadequate to provide protection for visitors from inadvertent radiation exposure. (13.7.37)

166. In view of the likelihood of persons engaging in salvage operations on the Monte Bello Islands, the AWTSC and the Government should have ensured that none of the abandoned material presented a radiation hazard. (13.7.37)

167. The Royal Commission concludes on the evidence presented that no one received a hazardous exposure to radiation, either by visiting the Islands or by salvaging abandoned material. (13.7.37)

168. When the Yalata community undertook salvage operations at Maralinga they should have been fully informed of the locations of radioactive dumps. (13.3.21)

169. The Maralinga Range is not acceptable in its present condition and it must be cleaned up. (14.2.20)

170. The aim of the clean-up should be to allow Aborigines access to the test sites without restriction. (14.2.20)

171. The Maralinga test sites, although not preferred camp sites, could form part of a more extensive area for food foraging

for Aborigines living a traditional lifestyle. They could also form a possible outstation for an Aboriginal community dependent on rations and water from outside. (14.2.20)

172. The assumptions made in the Australian Atomic Energy Commission (AAEC) report on clean-up options about the traditional lifestyle were realistic and a reasonable basis for estimating the hazard to Aborigines from the contamination. However, hazard assessments should be carried out for other possible lifestyles including a group establishing an outstation at Taranaki. Such a group would depend on food and water brought in from outside, and should be assumed to live on the ground in dusty conditions and rarely wash. (14.2.20)

173. The hazard from radiation at the Ground Zeros is not excessive. The concrete plinths with their warning messages are an adequate indication to people not to camp permanently at these sites. The level of radiation will decay to one of no significance during the lifetime of the younger people now returning to the area. (14.4.37)

174. The most significant hazard to Aborigines using the test sites is from the plutonium contamination. The hazard from the inhalation of dust raised by winds appears to be acceptable. However, three other pathways - inhalation by children digging and playing, ingestion through bush foods and injection of plutonium - do produce unacceptable levels of risk. From the range of estimates of the level of this risk in the evidence tendered to the Royal Commission, it is clear that more information is needed on the possible Aboriginal lifestyles in the area, the dust conditions in Aboriginal camps, the types and amounts of specific food items and the amounts of plutonium in these food items. Information on the particle size distribution of plutonium contamination is also very important and needs to be determined. (14.4.37)

175. The plutonium-contaminated areas must be cleaned up. However, more work is needed to develop realistic hazard assessments so that criteria can be derived for the clean-up; otherwise it is impossible to specify what areas must be cleaned, to what depth and to what level of residual contamination. (14.4.37)

176. The uranium contamination at Kuli is unacceptable. The uranium at or near the surface must be collected and either buried in proper pits or removed from the site. (14.4.37)

177. The pits containing plutonium waste at Taranaki and TM101 must be treated by either immobilising the plutonium in the debris or by removing the material from the pits. (14.4.37)

178. It will be necessary to carry out research to characterise the exposure pathways in order to determine what areas need to be cleaned up. A comprehensive and well co-ordinated research program is needed. (14.4.37)

179. Insufficient evidence is available for the Royal Commission to be able to assess with confidence that there is no hazard from beryllium at Maralinga and Emu. (14.4.37)

180. The following hazards must be dealt with before the Maralinga Range can be considered suitable for unrestricted access by Aborigines:

- (i) plutonium contamination at Taranaki, TM100, TM101 and Wewak;
- (ii) pits at Taranaki and TM101 containing plutonium-contaminated debris; and
- (iii) uranium and beryllium contamination at Kuli. (14.5.30)

181. The following hazards need further assessment to determine whether further action is required:

- (i) external radiation levels at the Ground Zeros at Maralinga and Emu;
- (ii) plutonium at Tadge;
- (iii) uranium and beryllium at other minor trial sites;
- (iv) glazing at some of the major trial sites;
- (v) waste buried at the airfield cemetery; and
- (vi) plutonium levels at the Emu site. (14.5.30)

182. Various options for clean-up were considered but the Royal Commission has not been able to make detailed recommendations because insufficient data were tendered on the levels of risk, options for clean-up and the associated costs. Nevertheless, the Royal Commission would suggest that any clean-up should include additional fencing in the short term, an emu parade to collect plutonium-contaminated fragments, the removal and burial of the plutonium-contaminated soil at Taranaki and action to immobilise or exhume the waste pits at Taranaki. (14.5.30)

183. The standard for clean-up should be to allow future unrestricted access to the site by Aborigines living a traditional lifestyle, establishing outstations, or building houses. (14.5.30)

184. A Maralinga Commission should be established to determine clean-up criteria, oversee the clean-up and co-ordinate all future Range management. The Commission should include representatives of the traditional owners, the UK and Australian Governments and the South Australian Government. (14.5.30)

185. Sections 400 and 1487 and the Emu site should be transferred to the traditional owners on the completion of the clean-up, or by agreement of all parties. (14.5.30)

186. The traditional owners of the Maralinga lands were denied effective access to these lands for over thirty years as a result of the British nuclear test program. This denial has contributed to their emotional, social and material distress and deprivation. (14.3.30)

187. The traditional owners of the Maralinga lands are eager to re-establish their traditional relationships with their lands and are responding keenly to attempts to make this possible. (14.3.30)

188. It is appropriate and fair that after the loss of use of their lands the Aboriginal people be compensated. Effective compensation would enable them, where and as they wish, to re-establish their links with the land as rapidly as possible and with as little hardship as possible. (14.3.30)

189. The Royal Commission concludes that responsibility for compensation to those people who have been denied use of their lands because of the nuclear test program should be assumed by the Commonwealth Government. (14.3.30)

190. The cost of clean-up of the Maralinga Range should be borne by the UK Government because the previous clean-up in 1968 was clearly inadequate and based on insufficient information. (14.6.14)

191. The UK included the Emu site in Operation Brumby. If any further clean-up of Emu is found to be necessary by the Maralinga Commission, then the cost of this treatment should be met by the UK Government. (14.6.14)

192. The Royal Commission sees no reason why the control of the Monte Bello Islands should not be transferred by the Commonwealth to the Western Australian Government under conditions agreed to by both Governments. (14.7.8)

193. Regular monitoring of the radiation levels on Alpha and Trimouille Island should continue. The physical and chemical state of the low level of plutonium contamination at the G2 site should be investigated to confirm that it presents no significant hazard under any likely land use. (14.7.8)

194. The cost of clean-up of the Monte Bello Islands should be borne by the UK Government. The problem there is not so much radiological as aesthetic but nevertheless the Royal Commission's view is that treatment is necessary. The primary responsibility falls upon the UK Government to meet the cost of this treatment although the matter was never covered by a formal agreement. (14.7.8)

AIRAC 9 and Other Reports

195. AIRAC 4 was a useful but limited survey of the radiological state of the Maralinga Range. (13.4.15)

196. The Report, AIRAC 9, prepared by the Australian Ionising Radiation Advisory Council is not an adequate scientific account of the testing program. In particular AIRAC failed to make adequate inquiries before offering its conclusions. This failure may have been due to an agreement with the relevant Minister to limit its inquiries. If so it should have indicated this in its report. Rather than give the impression of a thorough investigation it should have clearly indicated that it had not investigated and sought out evidence of ineffective controls. (15.1.29)

197. AIRAC with one exception spoke only to persons with an interest in advancing the view that the safety measures taken were adequate and effective. This had led to an apparent bias in the material before it. As a consequence the report cannot be described as an objective and impartial assessment of the situation. (15.1.29)

198. The following conclusions expressed by AIRAC are contrary to the evidence which was available to AIRAC. They should not have been expressed by AIRAC or should have been expressed with a qualification that AIRAC had not investigated or sought to find out whether there was evidence to the contrary:

'1.9 Before the fourth of the 12 tests, the Australian Government set up a safety committee, later known as the Atomic Weapons Tests Safety Committee (AWTSC), the members of which were to satisfy themselves that explosions were fired only when that could safely be done. The Committee was made up of persons with experience appropriate to that task.

'1.16 The criteria for safe firing were met in all tests.

'1.17 In one test (the first of the two tests at Emu in 1953) the fallout at inhabited locations about 160 km from the range, while not exceeding the requirements of the ICRP at that time, may have slightly exceeded the current ICRP Recommendations on dose limitation for members of the public. If that limitation was in fact exceeded, the excess would have been small and there would be no detectable effect on persons exposed then nor would there be recognisable effects at any later time.

'1.18 The precautions taken to ensure that Aboriginals living in the area were not endangered by the nuclear

tests were carefully planned and executed, and AIRAC has found no evidence that any Aborigines were injured by the nuclear tests.

'1.20 The measures taken to protect the public, and the personnel involved in the nuclear test programs, from radiation injury attributable to the tests were well-planned and almost certainly were effective. The possibility of incidents, e.g. unauthorised entry to a contaminated area, that may have led to serious unrecorded exposure cannot be completely excluded, but no evidence has been found that any such incident occurred.' (15.1.20)

199. The following conclusions expressed by AIRAC should not have been expressed by AIRAC or should have been expressed with a qualification that AIRAC had not investigated or sought to find out whether there was evidence to the contrary:

'1.12 Operations at the test ranges and associated areas were governed throughout by a requirement to comply with the radiation safety standards and dose limitations recommended by the International Commission on Radiological Protection (ICRP). The same Recommendations are the basis of legislation for radiation protection in Australia. The United Kingdom authority was responsible for this compliance. There is no evidence that there was any departure from compliance with those standards with respect to Australian personnel.

'1.14 A limited number of air crew may have been exposed to transient concentrations of radioactive substances exceeding the derived levels recommended for continuous exposure over a 13-week period, but not to total radiation exposures in excess of the recommended limits. This would be regarded as acceptable under current ICRP Recommendations. There is no evidence that any members of ground crews received radiation exposures in excess of the recommended limits.' (15.1.29)

200. Because of the paucity of relevant information on which it is based, the Donovan Report cannot be regarded as an adequate epidemiological study of the health of atomic test personnel. (15.3.10)

201. Because of the deficiencies in the available data, there is now little prospect of carrying out any worthwhile epidemiological study of those involved in the tests nor of others who might have been directly affected by them. (15.6.13)

Recommendations

Recommendation 1

The benefits of the Compensation (Commonwealth Government Employees) Act 1971, including the shifting of the onus of proof from the claimant to the Commonwealth should be extended so as to include not only members of the armed forces who are at present covered by the Act, but also civilians who were at the test sites at the relevant times, and Aborigines and other civilians who may have been exposed to the Black Mist.

Recommendation 2

To assist the Commissioner for Employees' Compensation in the performance of the additional duties recommended in Recommendation 1, a national register of nuclear veterans, Aborigines and other persons who may have been exposed to the Black Mist or exposed to radiation at the tests should be compiled.

Recommendation 3

Action should be commenced immediately to effect a clean-up of Maralinga and Emu to the satisfaction of the Australian Government so that they are fit for unrestricted habitation by the traditional Aboriginal owners as soon as practicable (see Section 14.4).

Recommendation 4

A Maralinga Commission, comprising representatives of the traditional owners, the UK, Australian and South Australian Governments should be established to determine the clean-up criteria, oversee the clean-up and co-ordinate all future Range management (see Section 14.5).

Recommendation 5

Action should be taken immediately to ensure that all areas of the Monte Bello Islands where the radiation levels are above the limits recommended for continuous exposure of members of the public are suitably signposted until safe for permanent occupation. Small pieces of debris should be collected to avoid

them being removed as souvenirs. The large structures remaining on Trimouille Island that are relics of the test programs could remain for historic interest (see Section 14.7).

Recommendation 6

All costs of any future clean-ups at Maralinga, Emu and the Monte Bello Islands should be borne by the United Kingdom Government (see Section 14.6).

Recommendation 7

The Australian Government should make compensation to those persons and descendants of those persons who have a traditional interest in sites at the former Maralinga Prohibited Area for loss of use and enjoyment of their lands since the beginning, and as a result of the atomic tests program. This should take the form of technology and services which Aboriginal people regard as necessary for them to re-establish their relationships with their land as rapidly as possible and with minimal hardship. (see Section 14.3).