

Submission to:

Inquiry into the Provisions of the Australian participants in British nuclear tests (Treatment) Bill 2006; and, the Australian participants in British nuclear tests (Treatment) (consequential Amendments and transitional provisions) Bill 2006

Senate Standing Committee on Foreign Affairs, Defence and Trade

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Australian participants in British nuclear tests in Australia

Vol 1: Dosimetry; Volume 2: Mortality and cancer incidence

The recently released findings of the Australian nuclear test participant health studies¹ provide a key part of the evidence base informing policy on care and compensation issues for the participants.

The Medical Association for Prevention of War (MAPW) acknowledges and commends the Australian government for finally conducting a long overdue study of health outcomes for Australian nuclear test participants, now 54 years after the first British nuclear test explosion in Australia². We believe the study deserves wider attention than it has so far received.

Mortality and cancer studies were conducted by researchers from the University of Adelaide, utilising data for the period 1982 – 2001 for cancer and up to 2001 for mortality. The non-cancer mortality rate in servicemen and civilian contractors participating in the nuclear tests was lower than in the Australian population (standardised mortality ratio, SMR, 0.95, 95% CI 0.94, 0.96). This is most likely due to a healthy worker effect.

However, cancer incidence was significantly higher in test veterans (SMR 1.23, 95% CI 1.18, 1.28). Cancer mortality was also higher (SMR 1.18, 95% CI 1.12, 1.24). Individual cancers with higher incidence and mortality among the servicemen included oral, lung, colorectal and prostate cancers. Cancers with higher incidence but not mortality were oesophageal cancer, melanoma and leukaemia.

The overall findings were similar for military and civilian personnel – the all-cause SMR was identical - 1.02 in both groups; cancer mortality was significantly raised in both –

¹ Department of Veterans' Affairs. Australian participants in British nuclear tests in Australia. Vol 1: Dosimetry; Vol 2 Mortality and cancer incidence study. Canberra, Department of Veterans' Affairs, 2006. Accessed online 7 October 2006 at http://www.dva.gov.au/media/publicat/2006/nuclear_test/index.htm

SMR for civilians 1.21 (95% CI 1.10, 1.32) and for military participants 1.17 (95% CI 1.10, 1.25)

A companion **dosimetry study** was methodologically more problematic and uncertain, with exposure data, limited to external photon irradiation, available for only 4% of veterans. Estimated exposures were low, with a mean of 2.8mSv, and only 4% of veterans were estimated to have received more than 20mSv, the current accepted annual occupational limit. No association was found between radiation exposure and cancer incidence or mortality. Nor was an association found between specific cancers and estimated radiation exposure, including leukaemias, which were assessed in detail.

Thus either estimations of radiation exposure were inaccurate, or some other exposure(s) associated with involvement in the tests increased cancer risk. However, the only likely other factor identified (not specific to nuclear testing) was asbestos exposure causing a disproportionately high incidence of mesothelioma among naval personnel, and possibly contributing to lung and colorectal cancers.

Confounding issues were addressed, including loss to follow-up, healthy worker effect and high prevalence of smoking. Elevated smoking rates which would explain increases in different smoking-related cancers are not consistent. The possibility of a synergistic carcinogenic effect of smoking and radiation exposure was not examined.

The reports note:

1. 25-fold reduction in the level of radiation exposure regarded as safe since the tests were done (Vol 1; p16);
2. lack of consultation before the testing (Vol 1; p 34 footnote)
3. hurried preparations (Vol 1; p 34),
4. communication breakdown between British and Australian governments about the tests (Vol 1; p 37);
5. "ignorance, incompetence and cynicism" regarding the safety of Aboriginal people (Vol 2; p 5);
6. secrecy and deception persisting today (Vol 2; p 6).

These points were outside the reports' scope.

Psychological trauma of involvement in nuclear testing is not addressed. However a small qualitative study component achieved 100% response rates, suggesting good qualitative research may be feasible.

Comments on the mortality and cancer study

Undertaking such studies so many years after the nuclear test program is difficult and introduces significant methodological challenges, reducing the power of such studies, though long follow-up is important to evaluate the true extent of health consequences with long latencies, such as following exposure to ionising radiation. The cancer and mortality study appears to have been undertaken probably as well as it could be. These factors add to the significance of the highly statistically significant excess cancer mortality identified in both military and civilian test participants.

The test participants were clearly a more healthy group than the general population – the similar overall mortality in participants and the general population, in the context of significantly raised cancer mortality, underscores that non-cancer mortality from important causes such as cardiovascular disease and external causes among the participants was significantly lower than expected. A more appropriate comparator would have been appropriately matched military personnel as similar to military test participants as possible in all respects other than nuclear test participation, as was done for UK, NZ and US studies of nuclear test veterans.

Significant **deficiencies** in the studies include:

- The cancer study window of 1982-2001 would have missed cancers occurring up to 30 years after the first nuclear test in Australia (1952). This is particularly relevant for leukaemia, which has a much shorter latency (approximately 5-15 years) compared with solid tumours which tend to have a longer latency and rates continue to rise for the lifetime of radiation-exposed persons. Excess leukaemia rates could have been missed by the observation period selected (necessitated by incomplete cancer data during earlier times).
- The absence of data since 2001 excludes cancers and deaths occurring in the last 5 years, during which elevated rates of these outcomes would be expected to continue to rise.
- The study excludes (largely because of unavoidable methodological challenges) about 6000 – more than one third - of the estimated 17,000 individuals directly exposed to the nuclear tests, including groups likely to include highly exposed individuals, such as Aboriginal people and some pastoralists living in the vicinity of test sites and subjected to local fallout.

Comments on the dosimetry study

The claim that the identified increases in cancer were unrelated to radiation exposure is implausible. Inadequate dosimetry estimates with widespread underestimation of exposure are much more likely. The findings of adverse health outcomes are consistent with data from all other available adequately conducted follow-up health studies of nuclear test participants³. Indeed all adequate studies of participants in atmospheric nuclear tests – including in the US, UK, NZ and France – identify increases in radiation-related adverse health outcomes, notably cancer. The similarity of findings between military and civilian test participants in the present study essentially excludes exposures associated with military service but not test participation, as causes for the adverse health outcomes for test participants. No evidence to support any other possible cause of the observed excess cancers is offered in the study report.

The availability of any film badge external photon exposure data for only 4% of test participants is an inadequate basis for sound dosimetry estimations, and the difficulties of conducting a retrospective dosimetry study several decades after the nuclear tests are greater than for cancer and mortality. Such difficulties are acknowledged in the report, eg regarding radiation exposure estimations:

“It must be understood, however, that some of the biggest uncertainties, which are not easy to quantify, are in the lack of detailed knowledge of what various participants in the UK atomic testing program were actually doing, where and for how long.” (Vol 1, p 66)

Despite the severely limited exposure data, there is clear evidence that some test personnel were exposed to very much higher doses than the 100 mSv used in the

³ Dalager NA, Kang HK, Mahan CM. Cancer mortality among the highest exposed US atmospheric nuclear test participants. *J Occup Env Med* 2000; 42(8): 798-805.

Muirhead CR, Bingham D, Haylock RGE, et al. Follow up of mortality and incidence of cancer 1952-98 in men from the UK who participated in the UK's atmospheric nuclear weapon tests and experimental programmes. *Occup Environ Med* 2003; 60: 165-72.

Pearce N, Prior I, Methven D, et al. Follow up of New Zealand participants in British atmospheric nuclear weapons tests in the Pacific. *Br Med J* 1990; 300: 1161-6.

study for all doses estimated to be greater than 50 mSv. The Royal Commission documented individual exposures up to 300 mSv, eg:

- Of the approximately 900 people involved in clean-up after the first Monte Bello test in 1952, it is estimated that 31 individuals received 30-50 mSv⁴.
- The crew of pressurised Canberra bombers who flew through the mushroom cloud from 6 minutes following the Totem 1 test had gamma doses measured on their film badges at the end of the flight of up to 210 mSv⁵. It is likely that crews in unpressurised Lincoln aircraft - who spent up to 55 minutes in fallout clouds without proper protective clothing, instruction, or radiation monitoring devices – would have received even higher radiation exposure.

Discrepancies between some recorded and estimated doses were highlighted during the preparation of the study reports. For example, members of the Joint Service Training Unit who undertook sample collection after the first (Hurricane) Monte Bello test, while wearing protective clothing, were *measured* by film badges to have received 20 mSv on each of days 66 and 67 after the test. In comparison, General Engineering Support staff, undertaking installation, access and recovery tasks in forward areas close to ground zero commencing on the day of a test explosion, frequently without protective clothing, for 4 Buffalo tests from days 1-50, and 3 Antler tests from days 1-115, ie a total duration of 165 days, in what is likely to have been a higher exposure setting, were *estimated* to have received only 19 mSv⁶.

Taken together, there is evidence that Australian test participants are likely to have been subject to a greater willingness to harm, and received less information, training, protection and monitoring, than British personnel. This evidence includes:

- A higher excess cancer mortality among Australian test participants than identified among a larger number of British test participants⁷
- Extensive personal testimony of Australian test participants
- The program was UK-run, with UK personnel including a higher proportion of officers and scientists, better provided with information and personal protective equipment than most of their Australian colleagues
- Australians were more likely to be involved in mushroom cloud sampling; forward, recovery and decontamination operations
- Radiation film badge data are available for 22.5% of British participants⁸, but only 4% of Australian participants
- A similar greater willingness to harm non-British personnel appears to have also applied to NZ and Fijian personnel involved in British nuclear tests in the Pacific eg NZ participants in UK Pacific tests took part on average in three times as many tests as UK personnel (3.6 vs 1.2)

As noted, the studies excluded about 6000 of the estimated 17,000 directly exposed persons, including some of those likely to have suffered the highest exposures⁹.

⁴ Commonwealth of Australia. The report of the Royal Commission into British nuclear tests in Australia. Vol 1. Canberra, AGPS, 1985:125-6.

⁵ Commonwealth of Australia. The report of the Royal Commission into British nuclear tests in Australia. Vol 1. Canberra, AGPS, 1985:207-8.

⁶ Major (ret) Alan Batchelor. Nuclear veterans cancer and mortality study, Letter to Defence Minister Brendan Nelson, 17 June 2006.

⁷ Muirhead CR, Bingham D, Haylock RGE, et al. Follow up of mortality and incidence of cancer 1952-98 in men from the UK who participated in the UK's atmospheric nuclear weapon tests and experimental programmes. *Occup Environ Med* 2003; 60: 165-72.

⁸ *ibid*

An excess of adverse health outcomes can be expected to continue to accrue as the approximately 50% of surviving veterans age.

In any case, the evidence that Australia test participants have and continue to suffer significant adverse health outcomes as a result of their involvement in the nuclear tests is clear and compelling, and is not altered by the attribution of the excess health risks.

2003 Review of veterans' entitlements

The comprehensive Review of Veterans Entitlements undertaken in 2003¹⁰ made a number of findings and 2 recommendations in relation to Australian nuclear test participants, which are summarized below:

- The recommendations of the 1985 Royal Commission had not substantively implemented
- No current comprehensive, non-adversarial, ready-access compensation arrangements were available for test participants
- There was widespread concern and mistrust regarding records lost, missing, or not available to participants eg
 - Maralinga hospital records
 - Dosage records for at least 2 military units involved in high-risk tasks of re-entry and recovery had been removed from the National Archives
- Substantial delays occurred at all levels:
 - Collection and reporting of health data
 - Comprehensive participant register
 - Policy decisions and action on independent recommendations
- 'the evidence is overwhelming that some, if not many of the activities undertaken in the course of the test program were unsafe'
 - Maralinga and Emu Field have been subject to extensive clean-up
 - Montebello is still considered hazardous by the government 50 years later
- There were departures, some serious and some minor, from radiation protection policy and standards during the nuclear tests
- The Australian government was forced to accept British assurances on safety without critical Australian examination
- Concept of a 'safe' level threshold for radiation exposure is now known to be inadequate
- Radiation exposure had increased risk of cancer among nuclear veterans
- There were sufficient grounds to believe that casualties could have occurred due to a combination of:
 - Radiation exposure
 - Toxic chemicals used

⁹Commonwealth of Australia. The report of the Royal Commission into British nuclear tests in Australia. Conclusions and recommendations. Canberra, AGPS, 1985.

¹⁰ Commonwealth of Australia. Report of the Review of Veterans' Entitlements. Canberra, Jan 2003. Available at: www.veteransreview.gov.au

- Inadequacies of some controls over the tests
- “The British atomic test series was an unparalleled event in Australia’s history, in which Australians were exposed to unusual risks from ionising radiation and toxic materials. On the basis of what is now known about the risks of cancers from ionising radiation, and the inadequacies of some of the precautions taken in the conduct of the tests, individuals were put at risk of contracting disease through their exposure in the tests.”
- “Apart from involvement in wars, other conflicts and overseas deployments, it is difficult to conceive of another Australian military operation in the 20th century comparable to the tests’ scale and risk of harm to individuals.”

“The concerns of the participants in the British atomic tests have been a long-standing issue. There has been an inadequate response by successive governments over many decades. It is a sad fact that the recognition of the unusual hazards faced by the participants has not led to prompt action to ensure a more appropriate compensation arrangement with ready access, given the nature of the hazards.”

“... it is in the interests of the participants and the Government for the [cancer and mortality] study to proceed as a matter of urgency.

...natural justice for these members is long overdue.”

Recommendations of the Review

1. Service with the British atomic tests should be declared as non-warlike hazardous service under Veterans Entitlement Act (VEA)
 - This would provide test participants, at least, with immediate and free health care for all cancers and for posttraumatic stress disorders whilst claims for compensation are made and assessed under the more generous reverse criminal standard of proof (ie unless evidence against relationship of illness to service can be proven beyond reasonable doubt)
 - Development of a nominal roll of participants and dosage estimates need to proceed quickly
 - The Government should consider thoroughly addressing the concerns of test participants about access to records
2. The Government should move quickly to finalise the cancer and mortality study

Recommendations

1. Australian nuclear test participants were exposed to a range of substantial and long-term health risks against which they were poorly protected. It is difficult to conceive of a more extreme situation of hazardous military service than close exposure to nuclear test explosions and their radioactive fallout.

Implementation of appropriate and compassionate care and compensation for Australian nuclear test participants is long overdue and must proceed expeditiously. About half of the test participants have already died, and recognition and justice have been denied for inexcusably and unacceptably long.

2. The two Bills currently proposed are a step in the right direction but are inadequate, in addressing only cancer testing and treatment. The most generous available level of care and compensation is warranted for nuclear test participants.

3. In our judgement, the findings and recommendations of the 2003 Review of Veterans’ Entitlements review are coherent, appropriate and compassionate. Those recommendations, made before the findings of the mortality and cancer study were available, are even more apt given the study findings of substantially increased health

risks for test participants. The Review recommendations should be implemented without further delay.

Concluding comments – unfinished business

Health outcomes for Aboriginal and other local residents exposed to fallout from the British nuclear tests have not been assessed, and these Australians have not benefited from government care or compensation programs addressing their unwilling exposure to radioactive fallout. The legacy of displacement and dispossession of related to the nuclear test program can be expected to be particularly adverse for Aboriginal people.

The 1985 Royal Commission recommended immediate clean-up of Maralinga and Emu Field 'so that they would be fit for unrestricted habitation by the traditional Aboriginal owners as soon as practicable'¹¹. The partial clean-up which has been undertaken is inadequate, with simple shallow burial of long-lived radioactive waste, and an area of 120 km² is still contaminated above a level of 3 kBq of americium-241/m², which was to be the acceptable maximum¹². Completing proper clean-up sufficient to enable permanent occupation is unfinished business for both British and Australian governments. The longer this is left, the greater the difficulty of completing the task and the greater the risk of dispersal and leakage of long-lived radioisotopes, particularly plutonium, and further unacceptable exposures to residents of the area.

In a broader context, particularly following the nuclear test explosion in North Korea on 9 Oct 2006, it is appropriate to note that nuclear tests are conducted for the development of nuclear weapons, of which there are currently 27,000 worldwide. They pose unprecedented and growing risks to global health¹³. Nuclear tests reflect and contribute to proliferation of nuclear weapons. Adverse health effects and environmental contamination also result directly from nuclear test explosions. These are significant and persistent, and will continue to need to be addressed over millenia. It is a public health imperative that both development and testing of nuclear weapons be prohibited, universally and urgently. Conclusion of a Comprehensive Test Ban Treaty, in the context of a reinvigorated commitment to abolition of nuclear weapons, should be urgent priorities for every Australian government.

¹¹ Commonwealth of Australia. The report of the Royal Commission into British nuclear tests in Australia. Conclusions and recommendations. Canberra, AGPS, 1985: 31.

¹² Parkinson A. Maralinga: the clean-up of a nuclear test site. *Medicine and Global Survival* 2002; 7:77-81.

¹³ Weapons of Mass Destruction Commission. *Weapons of Terror: Freeing the World of Nuclear, Biological and Chemical Arms*. Stockholm, Sweden, 1 June 2006: 17. Report at <http://www.wmdcommission.org>