October 24, 2006

Dr Kathleen Dermody
Secretary
Senate Foreign Affairs, Defence and Trade Committee
Parliament of Australia
PO Box 6100
Parliament House
Canberra ACT 2600
Australia

Dear Dr Dermody,

Thank you for the invitation to make a submission to the 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.

In order to help the Inquiry in its evaluation of my submission I would like to clarify several points relating to my own work before considering the value of the information on which the two Bills are based.

I should point out that references to myself and my research at p.5 in the Digest prepared for these Bills are not correct. I am not Australian born though I did grow up in Australia (during the nuclear testing period of which I was well aware) and studied and taught at Melbourne and Monash Universities, graduating with a BA First Class Hons and an MA. I moved to New York in 1975 and among other jobs I served as a Non-Governmental Organization representative at the United Nations for the London-based Minority Rights Group. I specialized in small state sovereignty issues, including the accession to 'independence' of the Republic of Palau, and the status of the Micronesian territories where the USA had tested its early nuclear weapons. When I moved to Scotland upon my husband's retirement in 1991, I began working in the medical social sciences at Dundee Medical School where I have been in post for 15 years teaching medical education and medical ethics and conducting research as a medical sociologist.

In 1995 I published a book[1] examining the flawed health studies conducted in the first 50 years after the atomic bombs at Hiroshima and Nagasaki. This helped members of the British Commonwealth Occupation Force in Japan and American servicemen who served in Japan to obtain war pensions in Australia, the UK and the USA. I was approached by nuclear veterans of the UK tests from Australia, New Zealand and the UK to examine their situation. Funding was secured for a simple self-reported morbidity study and

[1] Roff SR Hotspots: The Legacy of Hiroshima and Nagasaki. Cassell London and New York 1995

mortality report [2] of the members of the British and New Zealand Nuclear Tests Veterans Association. The collection of this sort of data does not permit statistical comparisons with other cohorts or the general population; the Digest errs in suggesting that I did this. However the study suggested that there was an excess of radiogenic cancers and other conditions among the British and New Zealand nuclear veteran respondents.

Because of the indications of a possible excess, this study caused the New Zealand government to commission a further study from myself and a Dundee colleague, which eventually resulted in proactive health care entitlements for New Zealand test veterans *and their families.* My non-epidemiological study also caused the UK Ministry of Defence to commission a third epidemiological study by the National Radiological Protection Board of the 22,000 UK nuclear veterans. Because of variances in case reporting (whereby my simple descriptive study reported more cases of a marker radiogenic condition, multiple myeloma, than did the far more sophisticated data-linkage studies carried out by the NRPB) an 'inter-comparison' of data was conducted [3] which indicated that the NRPB studies had under-ascertained this condition by at least 30%.[4] My understanding is that (in contrast to attempts to destroy the database a decade ago) data are still being collected on the cohort of 22,000 UK veterans with a view to an eventual further longitudinal analysis.

The information I have collected over the past decade has been used successfully in more than 60 pensions applications for veterans of the UK atomic and nuclear weapons tests in the UK and New Zealand. The Centre in which I work has been commissioned to update the medical protocols used by the Veterans Agency of the UK Ministry of Defence.

My descriptive morbidity and mortality study has been replicated by senior French researchers in relation to French and Polynesian participants in the French nuclear tests at Mururoa and the results have been used to secure the first pensions awarded for illnesses to these veterans in France.

In 1999 the Australian government decided to commission an epidemiological study despite their known limitations because of evidence that the health physics safety practices at the Australian sites was very inadequate and service men had been required to enter Ground Zero within minutes and hours of detonations. This study is the basis on

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[2] Roff SR (1999) Mortality and Morbidity of Members of the British Nuclear tests Veterans Association and the New Zealand Nuclear Tests Veterans Association and Their Families. *Medicine Conflict and Survival* 15 (Supp1)July-Sept 51 pp

[3] This was recommended by both Professor John Kaldor of the University of New South Wales and by the late Professor Alice Stewart of Birmingham University to test the robustness of the data-linkage strategies of the NRPB reports.

[4] Roff SR. (2003) Under-ascertainment of Multiple Myeloma among Participants in UK Atmospheric Atomic and Nuclear Weapons Tests. *Occup Environ Med* 60(12):e.18

which the present two Bills have been proposed. I will comment on aspects of the methodologies of the two parts of the study; the interpretation of the results; and the lack of transparency that has emerged in relation to this publicly funded study.

I make these methodological comments not as an epidemiologist but as a social scientist who has had peer-reviewed comments on radio-epidemiological research published in *The Lancet, British Medical Journal, and Pediatrics* as well as my paper demonstrating the under-ascertainment of cases in the UK nuclear veterans studies in *Occupational and Environmental Medicine.* My papers on the UK nuclear weapons tests were published in *Medicine, Conflict and Survival* - this journal is data-based in MEDLINE which only lists peer-reviewed journals.

I comment below on the lack of transparency in relation to the Adelaide studies from my understanding of international standards of research ethics based on five years service on the Fitness to Practice and Investigation Committees of the UK General Medical Council (where I am about to sit on a high profile research ethics case) and three years on the Tayside Local Research Ethics Committee in Scotland. I am also a Board member by ministerial appointment to the UK Postgraduate Medical Education and Training Board (where I chair the Audit Committee) and the Unrelated Live Transplants Regulatory Authority (now decommissioned except for appeals), but the views contained in this submission are purely personal ones.

I put many of these issues in to Minister Bruce Billson in letters in August and September 2006 but have never received an acknowledgement, much less a response, from the Minister's office.

I AUSTRALIAN NUCLEAR TEST VETERANS ARE SUFFERING *TWICE* THE RATES OF CANCER EXPERIENCED BY UK VETERANS OF THE SAME UK TESTS

The importance of the 'University of Adelaide Study' [5] [6] which caused these two Bills to be raised cannot be overestimated. Despite some methodological flaws which I will itemize, they seem (if the data collection and reporting is accurate) to be telling us that the nearly 11,000 Australian participants studied suffered *twice* the rate of cancers as the ±22,000 UK men studied in the 'NRPB studies'.

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[5] Carter M et al Australian Participants in British nuclear tests in Australia. Vol. 1 Dosimetry. May 2006 Department of Veterans' Affairs, Canberra at http://www/dva/gov.au/media/publicat/2006/nuclear_test/index.htm

[6] Gun R et al. Australian participants in British nuclear tests in Australia. Vol 2 Mortality and cancer incidence. May 2006 Department of Veterans' Affairs, Canberra at same web site.

The publication of these data on 10,983 Australian men who participated in the UK's atomic and nuclear weapons tests in Australia in the 1950s provide a valuable opportunity to compare the profile of the cancer mortality and morbidity reported with that detected among 21,537 UK men who served at the Australian and Christmas Island nuclear tests published in the third report from the National Radiological Protection Board in 2003.[7] The UK study only reports through the end of 1998 while the Australian study reports through 2001; however it is unlikely that the difference of 3 years will change the general trends in the data, although both studies should be continued and re-analysed every five years at least as the nuclear veterans proceed through the actuarially cancer-prone late decades of life.

Several important results emerge from comparison of the two studies:

- While 22.9% of the UK veterans had died by January 1, 1999 (Table 4.2), 50% of the Australian veterans were dead at December 31, 2001 – a doubling of the UK death rate.
- Although only half as many Australians were studied as Britons, the Australians had a total of 1465 cancer as cause of death, and 2456 incident [8], and the Britons 1493 cancer as cause of death and 2641 incident – i.e. approximately 11,000 Australian nuclear veterans had 95% the number of cancers reported for approximately 22,000 British nuclear veterans. Which is to say that the Australians were succumbing to cancer at virtually twice the rate the British veterans were.
- Both studies report the expected rates for mortality from all cancers. For the nearly 11,000 Australians the expected mortality was 1238.7 and the reported cancer mortality was 1465. For the nearly 22,000 Britons, the expected cancer mortality rate was 1593.24 and the detected 1493. This suggests a much higher rate of cancer mortality in Australia than in the UK since the Australian cohort was half the size of the UK cohort but the expected numbers of deaths from cancer in the Australian men were 78% of the UK figure. The nuclear veterans of both countries would of course be included in the national rates. *Even so, the Australian study reported an **elevated** risk for nuclear veterans of death from several possibly radiogenic cancers in comparison with the general male population; the UK study reported a **decreased** risk.*

- Of all the selected cancers for which comparative data could be retrieved from the two reports, only Liver Cancer is less frequent in the Australian cohort than in the UK cohort;

[7] Muirhead CR et al (2003) Mortality and Cancer Incidence 1953-1998 in UK Participants in the UK Atmospheric Nuclear Weapons Tests and Experimental Programmes. NRPB W-27. National Radiological Protection Board. Didcot 2003

[8] The use of the term 'incident' is problematical in the University of Adelaide Study as we will see.

- Several cancers have an elevated frequency of 1.5 to > 2.0 in the Australian cohort in comparison with the UK cohort;

- Cancers of the oral cavity (C00-14) are >4 times more frequent in the Australian cohort than in the UK cohort;

- Prostate cancer and thyroid cancer are nearly 4 times more frequent in the Australian cohort than in the UK cohort;

- Cancer of the gallbladder is nearly 10 times more frequent in the Australian cohort than in the UK cohort;

- Melanoma is nearly 6 times more frequent in the Australian cohort than in the UK cohort.

- The Australian researchers commented that more than half the potentially radiogenic cancers in their cohort were of the lung but contended that "at the most, one of the 432 lung cancer deaths is attributable to radiation exposure" (2:62) and 2 of the 406 lung cancer incidence cases. (The fact that fewer incident cancers than cancer deaths are reported is one of the methodological shortcomings of the University of Adelaide study that we will come to). They postulate a higher rate of smoking among the participants than the general male Australian population although it is admitted that "the mortality study of nuclear test participants has shown no excess mortality from chronic obstructive pulmonary disease (COPD)" (2:105) which would be expected if smoking was the cause. It is unlikely that the smoking habits of the UK men were any lighter than those of the Australians: UK servicemen were issued with coupons for tax free cigarettes from the NAAFI and given free cigarettes in their rations when they went on 'schemes' of work outside camp. [9] The expected mortality for the ±11,000 Australian cohort from lung cancer was 357.4 and the observed numbers of death was 433 for an SMR of 1.21 (Table 12.2 vol2). The expected mortality from lung cancer among the ±22,000 UK cohort was 541.83 and the actual reported deaths from lung cancer were 466 for an SMR of .86.

- Table 6.3 of the Australian mortality study discussion (p.67 v2) reports the SMRs for both Australia and the UK for all cancers 25 specific cancers, most of them potentially radiogenic. For the Australian cohort all SMRs are >1 with the exception of liver, stomach, testis and kidney. For the UK cohort only 11 SMRs are >1 and only one (Melanoma at 1.65) is >1.20. There are major differences in the SMRs for the two cohorts for cancer of the gallbladder (1.13 for Australia;

[9] Personal communications with Mrs Sheila Gray, widow of a British nuclear test veteran, and confirmed with several veterans. A member of the UK Territorial Army reports that cigarettes are sold at 2/3 of their shop price in TA canteens and soldiers going out on maneuvers are given as many packets as they wish 'on tick' against their next pay cheque even today.

0.29 for UK); thyroid (1.83 for Australia and 0.38 for UK) and cancer of the lung as above.

The large differences in cancer incidence and mortality for the Australian participants was probably due to the fact that they performed many of the dirtiest jobs at the atomic and nuclear weapons tests. Membership of the Australian Physics Health Group, the Maralinga Range Support Unit or beating the boundaries as a Peace Officer trying to exclude Aboriginal people from the vicinity was probably not a good protection against radiogenic cancer.

Only further longitudinal studies will clarify many of these points. It is imperative that both the UK and Australian studies review their data collection and data linkage methods since although the UK study claims to have covered 85% of the UK participants it has been shown [10] that it missed at least 30% of the multiple myeloma cases and this under-ascertainment may go beyond that condition. The nearly 11,000 men included in the Australian study is slightly less than two-thirds (65%) of the 17023 figure given in the Digest at page 3 for the number of Australian participants. It may be that the Australian government's extension of 'non-liability' priority health care to its nuclear test veterans will help to identify further subjects.

But further studies post 2001 will need to rectify the major problems in the present structure of the University of Adelaide study.

II PROBLEMS WITH THE DOSIMETRY ARM OF THE STUDY

There are two ways in which the Australian study avoids the obvious conclusion that participation in nuclear weapons tests is hazardous to human health, including those of the servicemen required to be present at their testing. Although it is acknowledged in the study Protocol that "Several post-trial cleanup operations have been conducted, most notably in 1963,1967 and during the 1990s." (1:167) and specifically that "Maralinga cleanup activities began in 1963 and were still occurring in the 1990s. As yet, the area is not fit for habitation by the traditional Aboriginal owners" (2:6), the highly speculative retrospective dosimetry calculations conclude that

"The estimated mean radiation exposure of the study population due to participation in the tests was 2.8mSv, only slightly greater than the background exposure received by every Australian every year." (1:vi)

One reason that this is likely to be a massive underestimation is that the internal doses were calculated by proxy from the putative re-suspension models for the vast desert environment in relation to work assessments of different categories of participant

[10] Roff SR. (2003) op cit

reconstructed decades after the tests. The study states: "Internal radiation exposures cannot be determined directly, but must be calculated from estimates of radionuclide intakes….An assessment of internal doses requires information on the time spent performing specific tasks and the probable intakes of radioactivity during that time." (1:78) This was done despite the caveat that "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." (1:66)

Despite the nature of working at the atomic/nuclear test sites it was concluded that internal doses from inhalation were not significant.

Speculative exposure categories were then created. Four out of five (79%) of the participants were assessed as receiving doses of less than 1 mSv – or half the annual dose received from background radiation in Australia. This category was then given the baseline value of 1.0 and the relative risks for the men in the other four categories were calculated against the assumption that "If an association with radiation exposure was present in this cohort, a trend to increasing deaths with categories of increasing exposure would be expected." (1.xx) This very crude technique of course on the one hand begged its own question and on the other relied on a simple linear paradigm without reference to bystander effects and other newer paradigms of mechanisms of internal accumulation over decades.[11] Pitting 80% of the cohort against the remaining 20%, it was not surprising that "Neither all cancers combined nor any cancer known to have an association with radiation showed any increase in mortality or incidence with increasing radiation exposure in this cohort." (1:xx) Thus it was concluded that "up to six of the 2456 total cancers could be expected to have occurred from the exposures in the study cohort." (1:xx)

The study had a cut off date of December 31, 2001. It is imperative that it be continued and that the data should be analysed by an international group of experts independent of the speculative reconstructive dosimetry. They might also consider the information available from Operation Brumby, the first attempt to clean up Maralinga. The UK Atomic Weapons Research Establishment Report on the extent of the contamination is in the National Archives of Australia and a digitalized version is available at http://caa12.naa.gov.au/scripts/imagineasp?B-1917355&1=1&SE=O. The Final Report on Operation Brumby detailing how decontamination was attempted over large areas of Maralinga in the 1960s is at http://naa12.naa.gov.au/scripts/imagine.asp?B=1918785&1=I&SE=0. Its author, Major W Cook, R.E. died of esophageal cancer and several of his team also died of cancers. One survivor with whom I am in contact has cancer of the larynx. Thirty years later the UK government paid Australia £20,000,000 [12] to try to achieve decontamination but as

[11] Roff SR Establishing the Possible Radiogenecity of Morbidity and Mortality from Participation in UK Nuclear Weapons Development. 2004 *Medicine, Conflict and* Society 20;3:218-242

[12] Parkinson A. The Maralinga Rehabilitation Project: Final Report. 2004 *Medicine, Conflict and Survival* 20;1:70-80

the University of Adelaide reports note, it has not yet been possible to permit the Aboriginal owners to return.

It is to be hoped that it doesn't take another decade for the important data in the 2006 reports to be reanalyzed because it may well be that they provide a very useful if tragic picture of **irradiation of personnel by inhalation pathways**. Since there are 72.78 metres of the original Nominal Roll for Maralinga held in the ACT section of the National Archives (Series A6456) it is to be hoped that future researchers are more adept than those who took five years to 'reconstruct' the cohort under study. The data linkage strategies need to be reviewed to ensure that they don't repeat the errors of the UK/NRPB studies which missed at least 30% of cases of an agreed marker condition, multiple myeloma.[13]

If left to stand, the present study suggests a hormetic effect for radiation exposure– see 2: Table 5.12. This effect is particularly marked for non-CLL leukaemias – see 2:Table 5.13. A similar negative relationship between putative radiation exposure and leukaemia was reported in the second UK study [14] (Table 6.14) – probably for the same reasons. The new Australian data bear close comparison with the UK data to see if significant trends are emerging for the different test sites and types of weapons tested. But most urgently the data need to be continued to be collected as the last five years and the next five may reveal important information about latency in radiogenic cancers – possibly induced by very low exposures. The studies may have an even wider significance beyond atomic and nuclear test veterans and Australia should take the lead in convening a consensus conference to agree the way forward.

III PROBLEMS WITH THE EPIDEMIOLOGICAL ARM OF THE STUDY

The term 'incident/incidence' is used in varying ways in epidemiology. Sometimes it is refers to cases of a condition [15]; sometimes to new cases; sometimes to only living cases; sometimes to living and those who have died of the condition. The Adelaide researchers have used the term to refer to living and dead cases. But as was explained to me

Sue

Your answers are as follows

The mortality study population was larger, and was followed for longer than the incidence study population. Thus it is quite possible that there were more deaths in the mortality study than cases in the incidence study (for some cancers).

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[13] Roff SR 2003 op cit

[14] Darby SC et al Mortality and Cancer Incidence 1952-1990 in UK Participants in the UK Atmospheric Nuclear Weapons Tests and Experimental Programmes. National Radiological Protection Board NRPB-R266 1993

[15] E.g Gun RT (1990) The incidence and distribution of RSI in South Australia 1980-81 to 1986-87. *The Medical Journal of Australia* 153:376-380

There is apparently an error in T12.2. Thank you for drawing it to our attention. It seems to have arisen in linking the data from two datasets into the one table. The total cancer mortality was 1465, as in table 5.2.

Phil Crouch

You still do not seem to understand that there were two separate cohort studies, on somewhat different cohorts, followed for different times.

One studied mortality, including cancer mortality. One studied cancer incidence - the total of fatal and non-fatal cancers.

As they were on different cohorts followed for different times, you cannot extract the number of non-fatal cancers.

Philip Crouch

However, Table 12.2 of Vol 2 'reconciles' both sets of data, with the result that 'mortality' figures exceed 'incidence' figures for several cancers (after correction of the table's errors).

This is unusual practice even in epidemiology. The only other place I know of it being done is in Dr Gun's recent papers on petroleum workers in Australia.

IV ISSUES RELATING TO RESEARCH ETHICS

There has been a troubling lack of transparency in relation to the Adelaide study, as commented on by Mr Griffin (MP Bruce) in the Second Reading of the Bills in the House of Representatives (*Hansard* October 11, 2006 p.130).

Amending data in a published report should always be accompanied by notice of same. This was not done in relation to amendment of the data in Table 12.2 of Volume 2 until questions were asked by the press. The effect of this failure has probably been to mislead researchers and veterans trying to work from the printed copy if they have not received addendum notices. It also has the effect that every time a researcher such as myself starts work on the issue again we have to check the fine print on the web version to see if more unannounced changes have been made.

The research team has been very reluctant to discuss the issues raised in good faith. The lead researcher for the epidemiological arm does not respond to emails. A non-epidemiological researcher has responded with sardonic comments of which the two quoted above are the most civil. The Chair of the Study Advisory Committee responded as follows:

Dear Ms Roff

By Study Group, I assume you mean the investigators in Adelaide who had the contract to do the Nuclear Test Participants Study. Dr Richie Gunn lead the Study Group and I assume that he would be able to answer you question.

I was Chair of the Scientific Advisory Committee, which has no continuing existence. Thus no one could now make any "official" statement from that

Committee.

Phil Crouch was a member of the Study Group as defined above, not of the Scientific and Advisory Committee.

Sincerely

Bruce Armstrong

Bruce Armstrong AM DPhil FRACP FAFPHM FAA
Director of Research, Sydney Cancer Centre
and
Professor of Public Health and Medical Foundation Fellow
The University of Sydney

This refusal by any epidemiologist associated with the study to discuss issues extends to the failure to disclose basic, standard calculations for the expected incidence and mortality figures which are of particular interest given the recent publication of studies of Vietnam veterans with decidedly lower expected figures. The researcher who does respond insists that the difference is explained by different age structures in the two cohorts despite the fact that the Vietnam cohort is 5 times larger than the Nuclear Veteran cohort. This point could easily be resolved by release of the standard calculations for both studies.

V ISSUES RELATING TO HAZARDOUS SERVICE

The 'smokescreen' interpretation of alleged excessive exposure to cigarettes as the major insult to the Australian veterans is invalidated by the data on lung cancer in the UK participants. It should be remembered that the Expected calculations for the adult male population would include the sufferers whose condition had been induced by the nuclear tests as well as those whose condition had other causes.

As indicated above, the retrospective dosimetry is highly speculative and the base line wrongly drawn. There has been no exploration of the work and working/living conditions of the men. The interpretation of the study's results is far from credible given the several attempts to clean up Maralinga in particular, and its still uninhabitable condition. More than 20,000 Australian and UK men lived and worked there through the immediate and local fallout periods of a series of atomic and nuclear weapons tests 50 years ago. There needs to be a reality check before Australian military/veterans epidemiology once again suffers a major international embarrassment. [16]

VI ISSUES RELATING TO COMPENSATION

The UK Veterans Agency of the Ministry of Defence has awarded at least 15 pensions in recent years for service-related radiogenic conditions arising from service at Maralinga and/or Monte Bello for individuals for whom I have submitted evidence.

[16] http://www.cancerpage.com/news/article.asp?id=3494

The Digest to these two Bills reports at footnote 36/p.21 that an average of $Aust126,561 has been paid in compensation to several claimants in relation to health disorders related to the tests. It also notes that of 79 common law actions against the Commonwealth instituted by ex-servicemen only 4 cases have been heard by the courts. From conversations with both the claimants and lawyers I have concluded that there seems to be a 'cartel' relating to the handling of these claims.

The Australian government has conceded liability in the successful claims as has the UK. It seems an extraordinary lapse in the much admired Australian sense of fair play that this situation should have been allowed to develop.

VI RECOMMENDATIONS

In congratulating the present Australian government on proposing the fullest and fairest response to the clear excess in radiogenic cancers reported by the Adelaide study despite the fact that ***all its shortcomings are in the direction of underestimation/understatement of the hazard and injury experienced***, I would urge that

- The present data be re-analysed in relation to more realistic dosimetry and evidence from the men of their work and conditions;

- The present data be further analysed in relation to the UK data which may lead to some very important understandings of the hazards of Monte Bello and Maralinga in comparison with the later tests at Christmas Island;

- Continued data collection be instituted as soon as possible to capture possibly the most cancer prone decades since 2001 in the cohort;

- The Expected incidence and mortality be checked in relation to other veterans studies from Korea to Vietnam and possibly the Gulf War cohorts;

- The significance of this cohort of probably irradiated personnel be appreciated for cancer studies in general;

- Consideration be given to the teratagenic implications for the offspring of the children such as has been accepted in New Zealand;

- The cohort be recognized for their hazardous service with the appropriate military service medals, an accessible pension process and compensation comparable to that already awarded on a selective basis.

As Sir Mark Oliphant remarked when I interviewed shortly him before his death several years ago about British atomic and nuclear testing in Australia, “It was a very naughty and nasty business.” This government has the responsibility to ensure that at least something was learned from its tragic consequences for the participants – something that will be important for cancer research in general.

I am happy to answer questions on the above, and can arrange a teleconference if that would be useful.

Yours sincerely,

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