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Images – Front Cover

Title: Exercise Red Flag

Caption: Personnel from No. 1 Squadron (1SQN) conduct a morning Foreign Object Damage (FOD) walk, as the sun rises in the desert. The SQN has 5 F-111s currently deployed as part of the Exercise Red Flag 02, at Nellis Air Force Base near Las Vegas, Nevada USA.

Date: 29/8/2002

Photo: Sgt Glen McCarthy 82WG Photo Section

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**Study of Health Outcomes in
Aircraft Maintenance Personnel
(SHOAMP)**

Phase II

**Mortality and Cancer Incidence
Study**

**Second Report
April 2004**

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VI SYNOPSIS

Background

Following a directive from the (then) Minister Assisting the Minister for Defence in April 2000¹, the Department of Defence commissioned an epidemiological study of the health of personnel involved in Desealing/Resealing (DSRS) of fuel tanks for the Royal Australian Air Force's F-111 jets. The first phase of this Study of Health Outcomes in Aircraft Maintenance Personnel (SHOAMP) included a literature review of the evidence of possible associations between chemical exposure and health outcomes, in addition to a qualitative study of a sample of those involved in DSRS and the development of a protocol for conducting a General Health and Medical Study.

An Interim Mortality and Cancer Incidence Report (with cancer and mortality linkage to 1999 and 2000 respectively) found no statistically significantly increased mortality or cancer in the group exposed to F-111 DSRS activities, relative to either non-technical personnel on the same Base, or technical personnel at another Base. However, due to the difficulties in record linkage and in adjusting for sources of statistical error, we suggested repeating the analysis of mortality and cancer outcomes.

This is therefore the Second Report of Phase II: Mortality and Cancer Incidence Study, completed in April 2004. In this report we present the results of the repeated analysis with the following changes based on recommendations from the Interim Report:

¹ Ministerial Directive – Minister Assisting the Minister for Defence, the Hon Bruce Scott, April 2000.

- Reassigning exposure using a standardised method, i.e. an Exposure Questionnaire; and generating a dose response model;
- Repeating the linkage process with the provision of middle names;
- Repeating the analysis using incidence density, i.e. all cancers not just first cancers;
- Performing a survival analysis; and
- Comparing results with the Australian population.

The third Phase of SHOAMP, currently under way, is a General Health and Medical Study, which will be reported separately.

Methods

Workers involved in F-111 DSRS activities were identified through Board of Inquiry (BOI) lists, interviews, media notices, a telephone Hotline, and reviews of squadron photos and records. Level of exposure was based on a combination of self-report, interviews and reviews of records. For this mortality and cancer incidence report, individuals were included in the exposed group if they had been classified by the Department of Veterans' Affairs (DVA) Contact and Recruitment personnel as having been involved in F-111 DSRS activities, or self-reported DSRS involvement via completion of an Exposure Questionnaire.

Two comparison groups were chosen as follows:

- Technical personnel at RAAF Base Richmond (New South Wales) serving between 1975 and 1999; this comparison was directed at assessing the effect of DSRS specific exposures over and above other exposures involved in the technical musterings; and
- Other personnel, not involved in technical duties, posted at RAAF Base Amberley (Queensland) serving between 1975 and 1999; this comparison was directed at assessing the effect of DSRS specific exposures, over and above any other local exposures at Amberley experienced by personnel not involved in aircraft maintenance.

Individuals in these comparison groups were identified via review of mustering types and posting dates in computerised personnel records (using Air Force Personnel Executive Management System, known as the AFPEMS database). Numbers of deaths and cancers for all three groups were determined by record linkage to the National Death Index and the National Cancer Statistics Clearing House respectively, through the Australian Institute of Health and Welfare (AIHW). At the time of the current study, these records were current up to the end of December 2000 for cancers and 2001 for deaths.

Analysis

Analysis was limited to males, since the number of females was insufficient for reliable analyses. Non-exposed individuals from both comparison groups were frequency-matched to the exposed group by weighting on strata that incorporated age category (5-year age groups), period of exposure or posting (5-year categories) and ADF Service rank (3 groups). Since some comparison individuals with long service records could be matched to multiple posting times within the study period, analyses were repeated using the first and last possible matching posting times.

The incidence of cancer and mortality in the two comparison groups was generated as the weighted number of cancers (first or all cancers) or deaths per total weighted person years of observation. Survival analysis was performed incorporating time to first cancer or to death. Comparisons with the Australian population were expressed as age-standardised incidence or mortality ratios. All analyses were undertaken for all exposed with subgroup analyses for those reporting involvement in F-111 DSRS Program 1 and Program 2 separately. In addition dose response analysis was conducted, with three dose categories based on tertiles of total length of exposure time.

Results

In total, 873 exposed individuals, 7577 Amberley comparisons and 9408 Richmond comparisons using first posting date (7228 Amberley and 9251 Richmond for last posting date) were included in the mortality and cancer incidence study. Table 1 shows the Incidence Rate Ratios for first cancers and all cancers for the exposed group relative to the Amberley and Richmond comparison groups, for comparisons selected using first and last posting dates.

Table 1 : Incidence rate ratios for first cancers and all cancers according to posting date

| Outcome | Control posting | Exposed vs Amberley | Exposed vs Richmond |
|--------------|-----------------|---------------------|---------------------|
| First cancer | First | 1.51 (0.96-2.29) | 1.45 (0.93-2.18) |
| | Last | 1.62 (1.03-2.47)* | 1.60 (1.02-2.41)* |
| All cancers | First | 1.45 (0.93-2.17) | 1.43 (0.93-2.13) |
| | Last | 1.56 (1.00-2.36)* | 1.55 (1.00-2.32)* |

* $p < 0.05$

Very similar point estimates were obtained using Cox proportional hazards models, and also when analysis was restricted to Program 1 participants and Program 2 participants, separately, although the width of the confidence intervals increased for the subgroup analyses.

Mortality was consistently and statistically significantly decreased in the exposed group, regardless of the comparison group, the choice of first or last posting date, restriction to participants in Program 1 or Program 2, or use of Cox regression models; risk ratios ranged from 0.18 to 0.45. Further, comparison with the Australian population indicated an increased cancer incidence of borderline statistical significance (SIR= 150.2, 95% CI= 99.89-217.05) and a statistically significantly decreased mortality (SMR=33.3, 95% CI=16.0-61.2).

Discussion

The analysis indicates a higher than expected incidence of cancer in the F-111 DSRS group, with an increase of around 40-50% in the incidence of cancer relative to both the Amberley and Richmond comparison groups. Although we cannot rule out selection bias (i.e. those with cancer in the exposed group preferentially participated in the study), or diagnostic suspicion bias (those in the exposed group presented more readily to medical attention and had their cancers diagnosed earlier), we believe that an elevated incidence in the exposed group is likely because:

- The point estimates are very consistent across all outcomes, control posting dates, and subgroup comparisons;
- Comparison with the Australian population indicates an almost identical point estimate;
- Survival analysis also yields similar results; and
- Correction for survivor bias drives the results further away from the null, i.e. increases the estimate of cancer risk associated with F-111 DSRS.

The elevation in risk appears to be specific to DSRS activities and not general aircraft maintenance, in that the DSRS exposed had a higher incidence than both comparison groups. Also, the elevation was apparent for both Program 1 and Program 2, although not statistically significant in these sub-group comparisons.

As yet, there is no corroborative evidence from within the exposed group of a DSRS effect, in that a dose-response relationship has not yet emerged, nor was there a greater risk elevation in cancers suspected "*a priori*" to be at a greater potential risk from DSRS exposures. Also, as yet, there is no evidence of a latency effect.

The absence of this type of corroborative evidence does not negate the evidence for an increased risk in the exposed group. Rather it does not contribute further evidence pointing to DSRS exposures as the responsible factor. With relatively few cancers so far available for study, it is clear that further follow up investigation

would be required for effective evaluation of dose response and other trends within the exposed group.

The consistent and statistically significant decrease in mortality in the DSRS group is paradoxical, but is likely a reflection of survivor bias, i.e. despite best efforts it was not possible to identify all DSRS participants who had died before the start of the study, leading to a falsely low mortality in the exposed group. This is supported by the low SMR relative to the Australian population.

Conclusion

We conclude that on the balance of probabilities, there is an increased risk of cancer associated with having participated in F-111 DSRS activities.

VII ACKNOWLEDGMENTS

We would like to take this opportunity to thank members of the Scientific Advisory Committee (SAC) and Consultative Forum, and representatives from the Departments of Veterans' Affairs (DVA) and Defence for their contributions to this Report. In particular, we extend our gratitude to Dr Warren Harrex from DVA for the preparation of files for matching and his diligence during data checking.

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VIII GLOSSARY OF TERMS

This section provides definitions for both acronyms and terms used in this report.

ABS – Australian Bureau of Statistics.

ad hoc – Latin term meaning “for this purpose”, and/or “for a specific purpose”.

ADHREC – Australian Defence Human Research Ethics Committee.

AFPEMS – Air Force Personnel Executive Management System.

AIHW – Australian Institute of Health and Welfare.

AWASCo – Amalgamated Wireless Australia Serco.

Bias – Error(s) that can cause a systematic deviation from the truth.

BOI – Board of Inquiry into F-111 (Fuel Tank) Deseal/Reseal and Spray Seal Programs.

C&R Team – Contact and Recruitment Team at the Department of Veterans’ Affairs responsible for contacting potential participants of the General Health and Medical Study (Phase III).

Comparison – Term used to describe those individuals whose work activities were not F-111 Deseal/Reseal related, for the purposes of the Mortality and Cancer Incidence Study.

Confidence interval – An interval used to estimate the likely size of a population parameter, giving an estimated range of values (calculated from a given set of sample data) that has a specified probability of containing the parameter being estimated.

Cox proportional hazards – The Cox proportional hazards model is the most commonly used regression model for survival data.

DSRS – Deseal / Reseal.

DVA – Department of Veterans' Affairs.

Epidemiology – Scientific discipline studying the incidence, distribution and control of disease in a population.

Exposed – Term used to describe those individuals whose work activities were F-111 Deseal/Reseal related, for the purposes of the Mortality and Cancer Incidence Study.

F-111 – Aircraft manufactured by General Dynamics, purchased by the Royal Australian Air Force from the United States Air Force. Also referred to as the “pig” or “aardvark”. The aircraft holds two crew, and are an all-weather strike, attack and bomber aircraft.

Frequency matching – Matching is a technique used to adjust for the effects of confounding. Frequency matching is where study subjects are matched according to group.

GD – General Dynamics.

HMRI – Hunter Medical Research Institute.

HSA – Health Services Australia.

Hypothesis – A tentative statement which may be tested through research.

IARC – International Agency for Research in Cancer.

ICD – International Classification of Diseases.

NDI – National Death Index.

NH&MRC – National Health and Medical Research Council.

Person years – The sum in years of each individual's time at risk.

Point estimates – Results of estimation can be expressed as a single value, known as a point estimate.

Posting – Location of work duties assigned to an individual.

PPE – Personal protective equipment.

Program 1 – One of four formal F-111 fuel tank Deseal/Reseal (DSRS) programs which were implemented over two decades (1975-1999). Program 1 at Amberley RAAF Base ran from October 1977 to December 1982. Earlier DSRS work was conducted at Sacramento from 1975.

Program 2 – One of four formal F-111 fuel tank Deseal/Reseal (DSRS) programs which were implemented over two decades (1975-1999). Program 2 ran from February 1990 to August 1993, including work conducted at Sacramento.

R4 and R5 – The “R” stands for “routine” servicing, and the number designates the type of service to be carried out on the F-111 aircraft.

RAAF – Royal Australian Air Force.

Rank – Position of authority and responsibility held within the Australian Defence Force, particularly the Air Force, for the purposes of this study.

Regression – Regression analysis is a statistical method used to examine the degree of association between two or more variables.

Risk ratio – A type of measure of relative risk. It is the ratio of the incidence rate in the exposed group to the incidence rate in the unexposed group.

SAC – Scientific Advisory Committee.

SHOAMP – Study of Health Outcomes in Aircraft Maintenance Personnel.

SIR – Standardised Incidence Rate; the rate of incidence of disease in the group of interest compared to that rate in the reference group.

SMR – Standardised Mortality Rate; the rate of mortality in the group of interest due to a specified cause compared to the rate in the reference group.

Solvent – A substance, usually a liquid, in which other substances are dissolved.

SR51 – A chemical desealant used in F-111 DSRS Program 1.

Spray Seal – One of four formal F-111 fuel tank Deseal/Reseal (DSRS) programs which were implemented over two decades (1975-1999). The Spray Seal Program ran from March 1996 to November 1999.

Survival analysis – Survival analysis is a statistical method for modelling time to outcome data. The variable of primary interest is the time interval between the starting time and the event of interest.

Tertile – Division of data for a variable into thirds.

TUNRA – The University of Newcastle Research Associates.

USA – United States of America.

Variable – A variable is a characteristic that is being investigated in a research study that differs from subject to subject and/or from time to time.

Weighting – The process by which data are adjusted to reflect the known population profile. A “weight” is the value assigned to a particular criterion, and if weighting is not carried out then the results will not properly reflect the results of the population being considered.

WHO – World Health Organisation.

Wing DSRS – One of four formal F-111 fuel tank Deseal/Reseal (DSRS) programs which were implemented over two decades (1975-1999). The Wing DSRS Program ran from August 1985 to June 1992.

1 INTRODUCTION

This section provides summary information on the background of the F-111 Deseal/Reseal processes, concerns of adverse health effects experienced by maintenance workers involved in the processes and establishment of the mortality and cancer incidence study.

1.1 Background

In 1963, Australia ordered 24 General Dynamics (GD) F-111 aircraft from the United States of America (USA). The aircraft, not yet constructed, were due to be delivered by 1968, however a series of problems deferred production so that the final delivery of the 24th aircraft did not occur until October 1973.

The Royal Australian Air Force (RAAF) describes the F-111 as a long-range, strategic strike and reconnaissance weapons platform, which forms a significant component of Australia's defence capability. The aircraft's capability is limited, however, by the amount of fuel it can carry which consequently impacts on the distances able to be flown. To minimise this limitation, the F-111 makes the best use of all available space and carries fuel in the wings, the fuselage and external fuel tanks.

Unlike many other aircraft, the fuel tanks of the F-111 do not contain internal bladders. This means that there is no barrier between the fuel and the internal metal surfaces of each integral fuel tank. As such, the joints and mating surfaces in the aircraft's structure need to be sealed to prevent fuel leaks. These sealing systems used complex chemical sealant formulations and applications. The sealants are required to cope with extreme environments including heat generated during super-sonic flight, structural strain as a result of manoeuvring and the chemically hostile

environment of being immersed in aviation turbine fuel. The sealant originally utilised proved to be inadequate for the task and significant fuel leaks became apparent soon after taking delivery of the aircraft.

1.2 F-111 fuel tank repairs and maintenance

F-111s have numerous fuel tanks of varying size (Figure 1).² At the time of manufacture sealant was put between the overlapping metal surfaces in the tanks. Over time the sealant used began to deteriorate and a variety of repairs and maintenance procedures were implemented, both on and inside the F-111 fuel tanks, to correct these problems. In particular, the repair of sealed surfaces was necessary to correct the fuel leaks as needed and was also a part of routine maintenance programs. This involved initially removing the original sealant inside the fuel tanks (Desealing) and replacing with new sealant (Resealing).

Removal of the sealant required, firstly, the use of chemicals, then physical removal using water jets, and then manual removal using hand tools. For the fuselage fuel tanks the process of desealing and resealing required physical entry to the tanks, while for wing tanks actual entry was not required. Four F-111 fuel tank Deseal/Reseal (DSRS) programs were implemented over two decades (1975-1999), each involving different processes. Following training and preparatory works (including work conducted at Sacramento) from 1975 to 1977, Program 1 ran from October 1977 to December 1982. The Wing Program used for maintaining the wing fuel tanks was conducted from August 1985 to June 1992. Program 2 ran from February 1990 to August 1993, again including work conducted at Sacramento. The Spray Seal Program ran from March 1996 to November 1999. Three DSRS programs – Program 1, Program 2 and the Spray Seal Program - all involved physical entry into the F-111 fuel tanks. For the Wing Program the tanks were open to the air and there was therefore no need for personnel to be completely inside the wing tank (Figure 2).

² Figures 1.1 to 1.4 printed with the permission of the Department of Defence, from the Report of the Board of Inquiry into F-111 (Fuel Tank) Deseal/Reseal and Spray Programs.

Figure 1 : F-111 with all fuel tanks highlighted

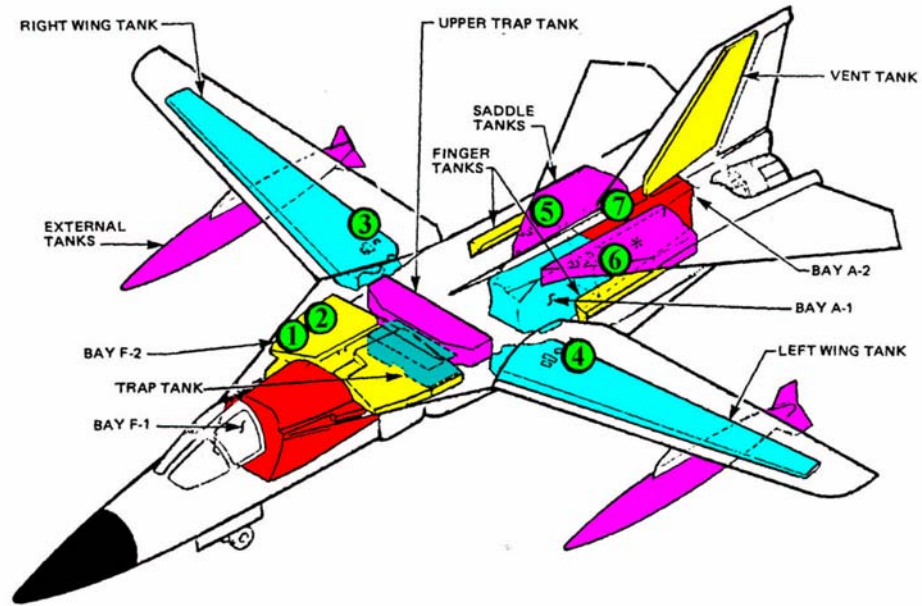
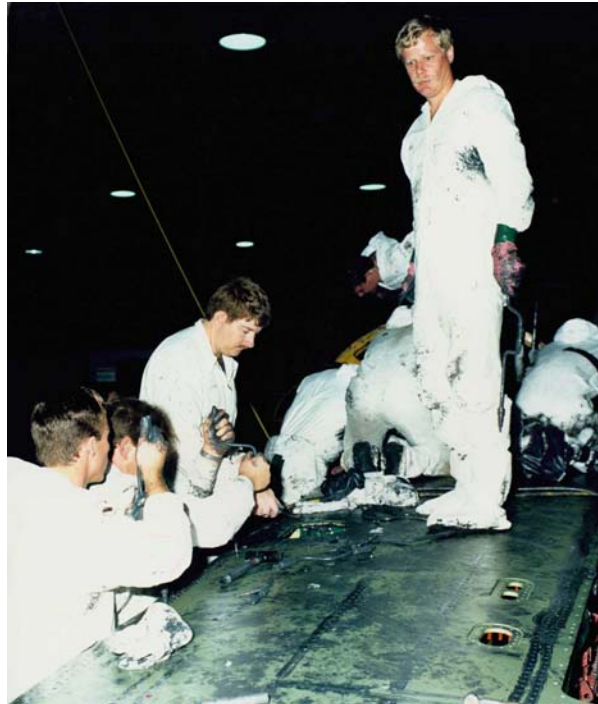


Figure 2 : Aircraft Technicians working on the Wing Program



Specific preparatory tasks were required prior to tank entry. This process involved removal of all fuel from the tanks (defuelling and depuddling) and then removal of plumbing and pipes (deplumbing). Once inside the fuel tank, maintenance personnel manually removed the defective sealant from the surface of the tank (desealing) (Figures 3 and 4).

Figure 3 : A Technician checking sealant in the fuselage tank



Figure 4 : An Aircraft Technician using a dental mirror and pick to remove sealant



The interior surface was cleaned and fresh sealant was laid (resealing). The tanks were then replumbed (replacing plumbing) and refuelled. The methods used for these processes changed over time. Spray sealing, a different process, did not require any sealant to be removed unless it was obviously defective. Instead, the surface of the old sealant was cleaned and prepared and a new coat of sealant was sprayed directly over the old sealant. This process was normally only used in the main fuselage fuel tanks of the F-111.

The Wing Program was developed in response to fuel leaks within the aircraft wings, which until 1985 were repaired in an *ad hoc* manner. As wing tanks were too small for maintenance personnel to enter, the top wing plank was removed from the aircraft and the tank completely opened so that work could be conducted from outside. Chemical de-sealants were not used in this process. Desealing was conducted using water picks and walnut shell blasting. The Wing Program also utilised contracted civilian workers from AWASCo (Amalgamated Wireless Australia Serco), under RAAF supervision.

Through the early to mid 1980s a series of maintenance programs were conducted on fuel tanks other than the fuselage and wing areas (i.e. the vent tanks and weapons bay tanks). This activity was conducted between the formal DSRS programs and involved a working environment similar to the Wing Program. In addition, aircraft undergoing routine servicing types (R4 and R5 for the F-111) in between the formal DSRS programs had individual fuselage fuel tank repairs, as did some aircraft allotted from the operating squadrons.

In the 1990s the United States Air Force began using the new spray seal process to repair F-111 fuselage tanks. This process produced huge reductions in the time taken to repair the leaks and consisted of 'water pick' de-sealing and cleaning, followed by an overcoat application of the sealant. The process was further refined to do away with the pick process and use only patch repairs with the new sealant being sprayed over the old one. This process was employed by the RAAF from 1996 until 1999, after which it was suspended.

Workers on the DSRS programs spent a significant proportion of their time inside the fuel tanks in conditions that were cramped, almost fully enclosed and inadequately ventilated. Individuals frequently worked in this environment for extended periods of time, sometimes up to five hours. The risk of exposure to jet fuel and the chemicals used in the sealant repair processes required the use of personal protective equipment (PPE). The protective equipment was unpleasant and additionally hazardous due to its weight and bulk, and because of its impervious nature it increased physical demands and interfered with thermoregulation. It was later found that that the protective overalls did not provide adequate protection from the chemicals so that workers wearing them came into direct contact with the chemicals in liquid and vapour form.

1.3 Other activities associated with F-111 DSRS

In addition to those tasks recognised as being directly associated with the F-111 DSRS programs (described above), there were also several other related activities conducted by RAAF personnel which could have also involved exposure to chemicals used during DSRS procedures. These associated activities included the mixing of DSRS chemicals and disposal of DSRS chemicals, as well as tasks carried out by personnel of other mustering types which involved periods of work in close proximity to the DSRS processes and ad hoc repairs conducted outside of formal programs.

1.3.1 Disposal, storage and mixing

Health and safety issues have been raised about the disposal methods used for some of the chemicals used in the DSRS programs, in particular, the process for the disposal of the chemical SR51 (a chemical desealant used in Program 1). Disposal techniques included incineration and storage of waste in drums. The BOI found that both these techniques were not properly conducted or were inappropriate as a means of disposal.

The incinerator was found to be malfunctioning over an unknown period, possibly years, and the storage drums were found to be leaking on more than one occasion. There was also evidence that SR51 was regularly (i.e. a couple of times a week) burnt during fire crew training between the late 1970s until approximately 1990.

Mixing of the sealant was another activity associated with potential exposure to toxic substances. In simulated workplace environments, testing showed that the level of exposure to airborne contaminants during mixing (while conducted in an open work area) was below the Workplace Exposure Standard.

1.3.2 Pick and Patch

There was some repair work similar to DSRS conducted on the F-111 fuel tanks prior to, during and after the formal Deseal/Reseal programs. The operation known as “Pick and Patch” was used to repair F-111 fuel tanks that were leaking. As with the formal DSRS programs, the Pick and Patch process involved entry into the F-111 fuel tanks, carefully locating suspect areas of sealant and removing the sealant from the area of concern and a margin around it, using solvents and tools such as dental picks. A patch of new sealant would then be applied.

The aircraft involved in this process were in operational squadrons. As such, the Pick and Patch process involved running (ad hoc) repairs by the best means available whenever needed, with a sense of urgency given the requirements for a certain number of aircraft needed to meet flying commitments at any one time. It also appears that many aircraft other than the F-111 were subject to this procedure and in some locations a number of maintenance staff were involved for various lengths of time. It is recognised that some individuals may have spent more time on Pick and Patch than working on the formal DSRS programs.

1.3.3 Other Contact

Other groups which have been defined as possibly exposed to DSRS substances include disposal crews, other flight maintenance crews, fire crews and RAAF members borrowed from other units during staffing shortages.

1.4 Health concerns

Despite the use of various forms of respiratory protection equipment and protective clothing, it is probable that DSRS workers were exposed to a variety of chemicals. The DSRS methods used during each program varied and occupational health and safety requirements for respiratory and skin protection may not have always been complied with. It is also not clear whether respiratory equipment was used in the first program.

In early 1999 concerns were raised by the officer in charge of the aircraft maintenance section at RAAF Base Amberley regarding various symptoms experienced by workers in the F-111 Spray Seal Program. The symptoms included memory loss, fatigue, and other neurological problems. Staff had been concerned over the possible connection between these symptoms and the F-111 DSRS work since late 1998. However a visit by two affected workers to the Amberley Base medical centre “failed to produce a response”. The officer in charge requested that tests be carried out “as deemed appropriate by medical staff” on the personnel in question. A full blood count, liver function tests and urinalysis were conducted on affected personnel. These were inconclusive and the medical centre discounted any association between the symptoms and the DSRS programs. In September 1999 a sergeant, new to the fuel tank repair section, became concerned by the same symptoms and encouraged the affected workers to report to the medical centre. The medical staff then referred the matter to a higher level at the Base. As a result the Spray Seal Program was suspended in January 2000.

1.5 Response to concerns

1.5.1 Internal investigation

In 2000 an internal investigation into the F-111 DSRS programs concluded that a significant number of personnel had presented with symptoms consistent with solvent or isocyanate exposure. This conclusion was based on the very strong presumptive evidence that workers had been exposed and their symptoms were consistent with that exposure. It was found that exposure could have arisen from:

- Entering tanks without adequate protective equipment;
- Exposure while removing protective equipment;
- Use of inappropriate or inadequate protective equipment for certain procedures;
- Failure to comply with procedures;
- Inadequate ventilation; and
- Exposure to very high concentrations of chemicals - such as kneeling in puddles (1).

The investigation found that this was not the first time concerns had been raised over adverse health effects associated with the DSRS programs. There were at least four documented incidents where workers in the first program had demonstrated symptoms consistent with chemical poisoning. None of these incidents had resulted in investigations being made into the work procedures associated with the programs. It was also apparent that there was potential for exposure to have occurred during all of the DSRS programs. In the face of the overwhelming potential health and legal consequences a Board of Inquiry was appointed to investigate the chemical exposure of the F-111 DSRS workers and to do so, where possible, in full public view.

1.5.2 Board of Inquiry

On 19th July 2000, the (then) Chief of Air Force appointed a Board of Inquiry (BOI) to conduct an inquiry into the effects on Air Force maintenance workers of possible chemical exposure during all RAAF F-111 fuel tank repair programs, dating back to 1975. The Terms of Reference for the BOI described the main role of the Board as pursuing inquiry into and making findings and recommendations concerning the following matters:

- a) The Deseal/Reseal Program conducted by the RAAF and/or contractors³ in the late 1970's/early 1980's, on F-111 aircraft at 501 Wing Amberley (the first Deseal/Reseal Program);
- b) The Deseal/Reseal Program conducted by the RAAF and/or contractors in the early 1990's on F-111 aircraft at 501 Wing Amberley (the second Deseal/Reseal Program);
- c) The Wing Tank Deseal/Reseal conducted from the late 1980's/early 1990's by the RAAF and/or contractors on F-111 aircraft at 501 Wing Amberley (the Wing Program); and
- d) The post-1996 Spray Seal conducted by the RAAF and/or contractors on F-111 aircraft at 501 Wing Amberley (the Spray Seal Program).

The BOI found there had been deficiencies in the Occupational Health and Safety procedures and inadequate incident and hazard reporting, among other factors. These deficiencies had potentially resulted in workers involved in the DSRS programs from 1975 to 1999 being exposed to toxic chemicals and suffering

³ The BOI stated that both RAAF members and contractor staff had been employed at various stages across the four DSRS programs, with Hawker De Havilland conducting the second DSRS program under contract and AWASCo providing contract labour staff to supplement Air Force personnel working on the Wing DSRS Program (BOI Vol 2, Part 1, Chapter 12).

adversely as a consequence. The report of the BOI provided support for the conduct of an epidemiological study which included mortality and cancer incidence of F-111 DSRS workers relative to a comparison group.

1.5.3 Epidemiological study

In order to determine if there was evidence to support the anecdotal reports of adverse health problems of personnel involved in the DSRS programs, an epidemiological investigation was commissioned by the Department of Veterans' Affairs (DVA). This investigation (the Study of Health Outcomes in Aircraft Maintenance Personnel) aimed to assess whether adverse health outcomes were associated with Deseal/Reseal programs or activities. Numerous outcomes were of concern, including mortality and cancer incidence, neurological and neuropsychological outcomes such as memory, cognition, anxiety and depression, and loss of colour vision.

The Study of Health Outcomes in Aircraft Maintenance Personnel (SHOAMP) consists of three phases. Phase I involved a detailed literature review to obtain the most recent information on the relationship between exposures potentially encountered during DSRS activities and possible outcomes, a qualitative study to obtain in-depth information on activities and exposures of individuals involved in DSRS, finalisation of definitions of the exposed and comparison groups and the development of a Protocol Manual for Phase III. Phase III of SHOAMP represents the General Health and Medical Study, involving a postal questionnaire and a series of health and neuropsychological examinations to assess exposure and outcomes for individuals involved in DSRS activities and appropriate comparisons. Phase II of SHOAMP concentrates on the issue of mortality and cancer incidence and is the focus of this report.

1.6 Study Organisation and Administration

The Study of Health Outcomes in Aircraft Maintenance Personnel (SHOAMP) is a collaborative study conducted by researchers from the Hunter Medical Research Institute and The University of Newcastle Research Associates (TUNRA Ltd). The study is administered by the Department of Veterans' Affairs on behalf of the Department of Defence.

1.6.1 Scientific Advisory Committee

The Scientific Advisory Committee (SAC) oversees the scientific aspects of the study. The SAC standing members are:

- Professor Judith Whitworth AC (SAC Chair), Director John Curtin School of Medical Research, Australian National University;
- Professor Michael Moore, Director NH&MRC National Research Centre for Environmental Toxicology, Queensland University;
- Professor Bruce Armstrong, Honorary Epidemiologist, NSW Cancer Council (Dr Roder's predecessor on the SAC, attended from 7-11-2000 to 28-5-2001);
- Associate Professor David Roder, Consultant Epidemiologist, The Cancer Council South Australia (supplant to Professor Armstrong, attending from 6-11-2001);
- Dr Deborah Glass, Department of Epidemiology and Preventative Medicine, Monash University; and
- Emeritus Professor Scott Henderson AO, Centre for Mental Health Research, The Australian National University; Clinical Adviser in Mental Health, Commonwealth Department of Health and Ageing.

In addition to standing members, the SAC is also regularly attended by representatives from a number of other organisations:

- Department of Veterans' Affairs
- TUNRA study team
- Defence Health Services Branch

- Air Force Headquarters
- F-111 Advocate's Office
- Australian Institute of Health and Welfare
- Health Services Australia
- SHOAMP Consultative Forum

1.6.2 Consultative Forum

The Consultative Forum provides a link between the SAC and interested parties. They receive regular briefings on proposals in relation to the conduct of the study and provide a forum for feedback from members on issues such as privacy, storage of information, history of the F-111 DSRS activities and selection of comparison groups.

Organisations represented by the Consultative Forum include:

- Department of Veterans' Affairs
- TUNRA study team
- Defence Health Services Branch
- Air Force Headquarters
- F-111 Advocate's Office
- SHOAMP SAC
- Warrant Officer of the Air Force
- Australian Veterans and Defence Services Council
- Armed Forces Federation of Australia
- Regular Defence Force Welfare Association
- Royal Australian Air Force Association
- Defence Community Organisation
- Returned and Services League of Australia Limited (RSL)
- SERCO Defence Services
- Repatriation Medical Authority
- Queensland Workcover
- Representatives from Deseal Reseal programs
- Health Services Australia

1.7 Ethical approval

Ethical approval was granted from the following institutional ethics committees:

- The University of Newcastle Human Research Ethics Committee,
- The Australian Defence Human Research Ethics Committee (ADHREC),
- The Department of Veterans' Affairs,
- The Australian Institute of Health and Welfare Ethics Committee,
- All State and Territory Cancer Registries.

Appendix A provides a complete list of all Ethics Committees from which approval was obtained. Extensions for the second matching exercise against the National Death Index and Cancer Registry data were submitted where necessary.

2 SECOND MORTALITY AND CANCER INCIDENCE STUDY

An Interim Mortality and Cancer Incidence Study was conducted in late 2002. It was based on the linkage of the study populations with data from the National Death Index up to December 2000 and all State and Territory Cancer Registries up to December 1999. The aims of that study were:

- To determine if there was an excess in mortality in the group who had been exposed to the F-111 DSRS fuel tank maintenance programs, relative to appropriate comparisons, and
- To determine if there was an excess of cancer in the group who had been exposed to the F-111 DSRS fuel tank maintenance programs, relative to appropriate comparisons.

No significant evidence of increased mortality or cancer was found in the group exposed to F-111 DSRS activities, relative either to non-technical trades on the same Base, or technical personnel conducting aircraft maintenance at another Base. However, the lack of a demonstrable effect does not imply the definitive absence of the same, i.e. it could not be concluded that the exposure was harmless. The presence of conflicting trends (i.e. decreased mortality but increased cancer) could not be explained easily and multiple difficulties with the data were identified. As a result, it was recommended that the analyses be repeated at a future time with the following variations:

- Reassigning exposure category and level when results from the Exposure Questionnaire (being collected for Phase III) became available. This questionnaire obtained standardised exposure assessment data, as well as dose and length of exposure.
- Repeating the linkage process with DVA records with the inclusion of middle names of individuals. This would increase the probability of matches. The

maximum amount of information is required for each individual to facilitate a more effective matching process and higher number of final matches for analysis.

- Performing a survival analysis to incorporate time to event, rather than just incidence.
- Making a comparison with Australian mortality and cancer incidences to put the analyses in perspective.
- Examining sub-types of cancer. The occurrence of rare cancers such as male breast cancer, or three eye melanomas⁴ should be examined, although power will obviously be very limited.
- Repeating the analyses using incidence density; this would count second and third cancers in individuals, instead of focusing on first cancers only.

This report presents the results of these further analyses.

2.1 Hypotheses

The hypotheses for this study were that:

- The risk of mortality in the exposed cohort would be at least two times that of the comparison cohorts, adjusted for gender, age, rank and exposure period; and
- The risk of cancer in the exposed cohort would be at least two times that of the comparison cohorts, adjusted for gender, age, rank and exposure period.

2.2 Specific concerns regarding cancer and mortality

The BOI's principal finding was that over 400 personnel exposed to chemicals used in the various DSRS programs had "...suffered long term damage to their health" (2). A number of workers involved in DSRS activities completed interviews and surveys about their health. Dr Eric Donaldson, an occupational physician with aviation medicine expertise, selected a subgroup of 110 workers for in-depth examination

⁴ One melanoma in a comparison person, one in an exposed individual. The third case occurred in a comparison individual prior to their allocated start date.

although it was stressed that the results of this examination were neither scientifically reliable nor conclusive.

The subgroup was shown to be suffering from a high number of "...symptoms consistent with those expected following absorption of toxic chemicals" (2). Many of the symptoms were found to be minor and transient and included headaches, dizziness, irritated eyes, abdominal cramps, body odour, contact dermatitis, diarrhoea and vomiting. There was also a broad range of psychiatric and neurological symptoms.

Apart from symptoms attributed by DSRS personnel to their work activities, the Donaldson report also described one case of disseminated sclerosis (multiple sclerosis), three cases of arthritis, one of breast cancer (male) and one each of diabetes, nephritis, and ankylosing spondylitis from the sample of 110. The comment was made that it was probable that most of these diagnoses had alternate aetiologies. There were also a number of birth defects, developmental abnormalities and allergies in workers' children, which the BOI found to be within the range expected for the general population (1).

Apart from the one case of breast cancer and instances of solar keratosis, there were no documented cases of carcinoma at that time. The reports to the BOI by workers of an increased incidence of bowel and bladder cancers occurring within this group remained unsubstantiated. In concluding, the BOI stated that there was "no suggestion in the evidence available to the Board of early mortality among exposed workers. We draw no conclusions about cancer, early mortality or effects on the next generation; these are matters for the DVA study" (2).

2.3 Literature Review

The acute health effects of simple organic solvents are reasonably well known and well described. However the long-term effects of these solvents and any possible associations with chronic diseases are unclear. In addition, the effects and interactions of complex mixtures and multiple concurrent exposures, such as occurred during DSRS activities, are even more poorly characterised.

A thorough literature search was conducted as part of Phase I of SHOAMP. The Report on the Literature Review should be referred to for a detailed description of associations described to date. This short review aims only to present highlights of the report relevant to the Mortality and Cancer Incidence Study. For a number of substances used in the F-111 DSRS programs, the level of evidence for carcinogenicity is high, and these have been classified by the International Agency for Research in Cancer (IARC). A summary of chemicals associated with F-111 DSRS programs and their associated cancer classifications is presented in Table 2.

Two known carcinogens are particularly worth noting: benzene and hexavalent chromium. Benzene is known to cause acute and chronic nonlymphocytic leukaemia, chronic lymphocytic leukaemia and haematological cancers (3). More recently, there has been a suggested risk of lung and nasopharynx cancer from benzene exposure in a Chinese cohort (4).

A number of chromate substances, which contained the hexavalent form of chromium, were used in the DSRS process. These included lead chromate, chromic oxide, strontium chromate and zinc chromate. Of particular concern is strontium chromate, which was an ingredient in the primers that were applied with spray guns in the spray seal program. Hexavalent chromium has been classified as a human carcinogen with links to pulmonary, lung, nasal, pharyngeal, gastrointestinal and sinus cancers.

Other exposures involved in the F-111 DSRS activities are only classified as possible carcinogens; these include carbon black, linked to lung and oesophageal cancers, and ethylbenzene, linked to renal cancer. Carbon black was an ingredient of the epoxy barrier, epoxy primer and fillet sealant used in DSRS. In all cases exposure was not in a dust form. Ethylbenzene was present in a number of formulations including detergents and primer. The detergents and primers were used extensively throughout all of the programs.

The occupation of painter and exposure to white spirits (also known as Stoddard solvent) and naphtha was evaluated by the International Agency for Research on Cancer (IARC) in 1989 (5). These substances were classified as probable carcinogens in painters, with associations to cancers of the lung and prostate as well as Hodgkin's lymphoma.

Crystalline silica has been strongly linked to lung cancer and is considered carcinogenic to humans. However, in F-111 DSRS the silica was in the form of amorphous hydrophobic silica (not crystalline) which IARC has evaluated and found that at this time there is insufficient evidence to consider as carcinogenic to humans. The silica was part of the formulation of the fillet sealant, spray sealant and epoxy barrier. Under these circumstances exposure was minimal and in a form unlikely to present a risk of cancer. As discussed previously, the carcinogenicity of many other exposures cannot be classified, due to their complex nature. The combined effects of even simple exposures taken concurrently are not well defined.

In conclusion, a number of the substances to which F-111 DSRS workers have been exposed are either known or possible carcinogens. The synthesis from the literature demonstrated that the following cancers should be particularly noted in those exposed to DSRS activities: haematopoietic (including leukaemias and multiple myeloma), gastrointestinal (including stomach, bowel, liver and pancreatic), genitourinary tract (including prostate, bladder and testicular), pulmonary and buccal cavity (including sinus, nasal, and pharyngeal).

Table 2 : Summary of Chemicals Used With F-111 DSRS Programs and Their Associated Cancer Classifications

| Chemical | IARC Classification | Exposure | Form of Exposure | Predicted Exposures ⁵ | Type of Cancer | Ref |
|---|-----------------------------------|--------------|---------------------|---|---|-----|
| Benzene (Jet Fuel contains 1%) | 1: Carcinogenic to humans | All programs | Inhalation & dermal | Not considered by Connell & Miller | Acute & chronic nonlymphocytic leukaemia, chronic lymphocytic leukaemia, haematological cancer | (3) |
| Chromium VI (component of lead chromate, zinc chromate, strontium chromate & chromic oxide) | 1: Carcinogenic to humans | All programs | Inhalation | Excessive inside tank with constant spray emission in low ventilation | Pulmonary, lung, nasal, pharyngeal, gastrointestinal, sinuses Shown to produce sister chromatid exchanges, chromosome aberrations, DNA strand breaks, formation of alkali-sensitive sites, and intrastrand DNA-DNA and DNA-protein cross-links | (6) |
| Carbon black (as pigment in paints)♦ | 2B: Possible carcinogen to humans | All programs | Inhalation & dermal | Not considered a high potential risk chemical | Lung & oesophagus | (7) |

♦ Although carbon black has an IARC cancer classification, the classification is for respiratory exposure of dust. In F-111 DSRS it is unlikely to have become airborne

⁵ As predicted by Connell & Miller in their report “Toxicological Assessment of Deseal/Reseal Chemicals – F-111 Fuel Tanks” prepared for the BOI.

Table 2 continued...

| Chemical | IARC Classification | Exposure | Form of Exposure | Predicted Exposures | Type of Cancer | Ref |
|--|---|--|---------------------|---|--|-----|
| Ethylbenzene (constituent of paints) | 2B: Possible carcinogen to humans | Program 1 Program 2 Wing Program Spray Seal | Inhalation & dermal | High to excessive inside tanks | Renal adenomas observed in animal studies | (8) |
| Petroleum solvents including white spirits, naphtha, Stoddard solvent | 3: Not classifiable as carcinogenic to humans | Program 1 Program 2 Wing Program | Inhalation & dermal | High to excessive inside tanks | Limited evidence of lung, prostate, Hodgkin's lymphoma | (6) |
| Silica (Amorphous Hydrophobic form) | 3: Not classifiable as carcinogenic to humans | Spray seal | Inhalation & dermal | Medium with high uncertainty factors | Not applicable | (9) |
| Jet Fuels including JP-4 | 3: Not classifiable as carcinogenic to humans | All programs & at other times | Inhalation & dermal | Not considered by Connell & Miller | Evidence of skin cancer | (5) |

3 METHODS

Occupational studies have a long and productive history in identifying causes of cancer. Many chemicals classified as carcinogens by IARC were first evaluated in the workplace (10). The retrospective cohort has historically been the method of choice for occupational studies and it has successfully identified many of the established chemical causes of cancer. This design allows the assembly of large numbers of people with exposures of interest from a relatively small number of environments. The elements of a cohort study are:

- The identification of a study population of persons exposed to the factors of interest;
- The identification of a comparison (reference) population;
- Follow-up of the populations over time; and
- Comparison of disease rates between the exposed cohort and reference population.

3.1 Study Design

Phase II of the SHOAMP project, the Mortality and Cancer Incidence Study, was a retrospective cohort study. The method consisted of identifying all persons with possible involvement in or exposures related to activities conducted as part of F-111 DSRS programs conducted at RAAF Base Amberley (and at Sacramento) between 1975 and 1999 and identifying two comparison groups.

The dates of death and/or diagnosis of cancer of the participants were ascertained up to the time for which complete computerised coded data were available from the AIHW (December 2001 and 2000 for death and cancer respectively). Determination of an excess of disease was calculated by various methods which involved:

- The comparison of age-specific death and cancer incidence rates between the exposed cohort and the comparison groups; and

- The comparison of age-specific death and cancer incidence rates between the exposed cohort and the Australian population.

3.2 Study Population

3.2.1 Exposed Cohort

The Board of Inquiry concluded that "...the exact number of tradespeople and supervisors employed on the various stages of the DSRS programs and on closely allied duties was difficult to determine because the workforce was quite fluid". During the course of the Inquiry, approximately 800 people were identified as having been involved in DSRS at the working level to some degree.

The identity of these individuals was determined from fuel tank repair records, RAAF posting and attachment records, and contractor staff records. Photographs were used to identify people who were working on the programs. These people were then able to name co-workers who had not been identified by the other methods.

The list of personnel named by the BOI was not exhaustive and DVA has worked to expand this list following completion of the BOI. A wide advertising scheme had been operating to inform people who had worked on the programs about the possible health risks and to request individuals who may have been involved in F-111 DSRS activities to contact DVA and register. A Hotline was established and advertising appeared in national daily newspapers as well as in internal Defence publications and circulars and on official web-sites (see Appendix B for one example). Workers who had been in contact with DVA were asked to name anyone else they could remember who might have been at risk of DSRS exposure.

It has been difficult to ascertain exactly how many people have worked on the programs over the past three decades and especially difficult when trying to include personnel who may have been affected but were only peripherally involved in the

programs. While the BOI had a high level of confidence that those identified represented the full complement of people involved across the four programs, this is still unconfirmed.

In addition the BOI also identified two other groups who may have been at risk from DSRS activities. The first group involved personnel employed on duties closely related to DSRS. These included tradespeople who carried out fuel tank repairs outside the formal DSRS programs. Because it was always an ad hoc program, it has not been possible to locate all the people who may have entered an F-111 fuel tank for “Pick and Patch” work. This activity was not recorded on individual service records or listed in any way that would allow a comprehensive list to be generated. Individuals whose only exposure has been in Pick and Patch outside the formal DSRS programs at Amberley have not been included in the study group. The exclusion of Pick and Patch individuals should enable the study group to be more tightly defined and maximise exposure and possible outcome effect. The findings of the study (particularly in relation to Deseal/Reseal Program 2) may well apply to them, however they cannot be included in the study without running the risk of introducing volunteer bias.

The second group of potentially exposed individuals included personnel working in proximity to DSRS activities. The most obvious group considered to be at risk were the boiler attendants whose job it was to dispose of the used SR51⁶ by incineration. Surface Finishers who repaired the fuel tank paint as required, Electrical Fitters/Avionics Technicians who removed and then reinstalled electrical components within the fuel tanks, and Non Destructive Inspection Technicians who performed structural inspections before tanks were resealed were also part of this group. Immediately prior to application of both primer and sealant to fuel tanks a number of products first had to be mixed. This was performed using a mechanical mixer. Individuals who undertook this task were also considered to be potentially at risk of chemical exposure.

⁶ SR51 was the thiophenol-based chemical desealant used in Program 1.

When the DVA Hotline was contacted by potentially exposed individuals, each person's details were recorded and added to the database. The individual was then categorised by DVA according to exposure. The assessment of exposure by DVA sometimes included searching of service records, follow-up contact with individuals and checking other available records. Generally, the basic means of allocation has been whether the tasks that person carried out were defined by the BOI as exposure category 1, 2 or 3. The categories were defined as:

- Category 1 – involved directly with DSRS process or had exposure to DSRS chemicals;
- Category 2 – worked in close proximity to DSRS activities; and
- Category 3 – at RAAF Base Amberley during the DSRS period of interest.

The criteria used to categorise workers have evolved over the past two years and some individuals have been moved from one category to another (i.e. from “worked in close proximity” to “exposed”) as more information came to light. DVA has tried to capture the names of as many individuals as possible who may have been involved with the DSRS programs or worked within close proximity even though they may not be eligible to participate in the study. In addition, there were 146 participants who contacted the DVA Contact & Recruitment (C&R) Team following the process of exposure classification. These individuals were therefore not allocated a DVA exposure category.

3.2.2 Classification of Exposure

In reporting the results of the Interim Mortality and Cancer Incidence Study, it was recognised that the assignment to an exposure category by DVA telephone personnel was somewhat subjective, and could be open to misclassification. It was recommended that exposure be assigned in a standardised and detailed manner which would allow information on type and degree of exposure to be obtained for both Phase II (Mortality and Cancer Incidence Study) and Phase III (General Health and Medical Study). To achieve this, an Exposure Questionnaire was developed which required potentially exposed individuals to indicate which F-111 DSRS

activities they had been involved in and for how long (Appendix C). The questionnaire was sent to all individuals registered on the DVA F-111 DSRS database. Four hundred and forty-six (62%) individuals from this category returned their questionnaire. The database contained 19 persons who were known to be deceased, 10 of whom were categorised as being involved in DSRS. The exposure status of these 19 was confirmed by DVA officials.

Where an “exposed” person could not be contacted, or declined to complete an Exposure Questionnaire, the exposure originally recorded in the DVA F-111 DSRS database was assigned. Using their Exposure Questionnaire information, a person was assigned “exposed” status if they indicated participation in any of the DSRS activities or programs, i.e. saying “yes” to any of the umbrella questions in sections A to G of the questionnaire relating to Program 1, Program 2, Wing DSRS, Spray Seal DSRS, storage, disposal and mixing respectively. Most respondents were classified electronically after information from their Exposure Questionnaire was entered into the database. This involved a search for positive responses to any of the questions in sections A to G (i.e. where a respondent answered “yes” to any DSRS activities). Classification via manual review of qualitative comments followed for all those who were not able to be electronically classified as exposed, but who reported activity in section H (“other duties that may have been associated with the DSRS programs”) or made additional comments in Section I of the questionnaire (“any other types of work activities that we have missed”). Two respondents were manually reclassified on the basis of the comments they had provided, which indicated tank entry to engage in tasks associated with a DSRS program.

While 1226 workers were included on the DVA F-111 DSRS database initially (as at database lockdown on September 12, 2002), a further 146 later registered, all of whom were sent an Exposure Questionnaire to determine exposure status (refer Table 3). Of the 446 individuals classified by DVA as having been involved in DSRS who returned an Exposure Questionnaire, 411 (92%) were classified as exposed according to the guidelines outlined above. Since the exposure classification was so high for this group, all those who did not return a questionnaire in this group were also considered to be exposed. An additional 232 individuals were also categorised

as exposed from their questionnaire: 107 originally in category 2, 61 originally in category 3 and 64 newly exposed. These reclassified individuals were eligible for inclusion in the Mortality and Cancer Incidence Study.

Table 3 : Summary of exposure categorisation from Exposure Questionnaire

| | DVA (& BOI) n = 1226 | | Late registrations n = 146 | TOTALS |
|--|----------------------|------------------|-------------------------------|--------|
| | Category 1 | Categories 2 & 3 | | |
| Did not return EQ, considered exposed | 273 | 0 | 0 | 273 |
| Returned EQ and met exposure criteria | 411 | 168 | 64 | 643 |
| Did not meet criteria | 35 | 339 | 82 | 456 |
| TOTALS | 719 | 507 | 146 | 1372 |

3.2.3 Comparison Cohorts

It was important that the comparison cohort was derived from the same source population as the exposed cohort to ensure that the groups being compared were as similar as possible with respect to all other factors except the exposure of interest. Comparison with a cohort from the general population was not considered appropriate for SHOAMP, due to the health and fitness requirements of those applying for and being accepted into the Defence Force, in addition to lifestyle and cultural issues associated with employment in the Defence Force.

The comparison cohort therefore consisted of Air Force personnel, of similar age and sex distribution, period of exposure or posting and military status to the exposed cohort. As well as problems of selection bias in obtaining comparisons, there was also the issue of exposure of Air Force personnel to other potential hazards that were not specific to the DSRS program. These hazards included a range of chemicals and

other exposures, including jet fuel. Contemporaneous comparisons were used – i.e. individuals with equivalent characteristics to the exposed personnel at the time of the F-111 DSRS fuel tank maintenance programs. Because of the uniqueness of the exposure, it was considered appropriate to have two comparison groups, each of which was similar to the exposed group in at least some respect. Observing a similar association for a number of different comparison groups would add strength to the study findings.

The first comparison group included all Air Force personnel posted to RAAF Base Amberley at the time the DSRS programs were conducted, but in non-technical musterings (job categories). This enabled a comparison of individuals with similar environmental exposures, but who were not exposed to the aircraft maintenance duties in general, and DSRS specifically. This group should therefore not have been exposed to other chemicals or hazards inherent in any form of aircraft maintenance. The second comparison cohort consisted of all Air Force personnel posted to RAAF Base Richmond at the time of DSRS programs or activities, in technical musterings. This allowed for the comparison of cancer diagnosis and/or death for DSRS exposed individuals over and above any adverse effects of general aircraft maintenance. The mustering categories defining the Amberley and Richmond comparison groups are listed in Appendices D and E respectively.

Data for the comparison group sampling frames were provided by DVA from the computerised Air Force Personnel Executive Management System (AFPEMS). Two different files were provided for each comparison group. The first was a file of personal details, and included service number, gender, date of birth, date of enlistment and date of death (if applicable), with one record for each individual. The second file included posting details, with one record for each posting or attachment to the relevant RAAF Base within the study time period. A brief description of the procedure for obtaining the comparison cohorts is provided in Appendices F and G. The files only included new postings or a change of employment status (i.e. change in rank or medical fitness) for individuals between 1 January 1975 and 31 December 1999. Individuals who were currently serving at the relevant Base could not be identified until there was a change in their posting or employment status.

The comparison and exposed cohorts were matched for the following variables:

- Gender;
- Age group (≤ 19 , 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75+; based on age at September 12, 2002, the date of first lockdown of the DVA F-111 list);
- Period of posting or exposure; and
- Rank (Enlisted, Non-Commissioned Officer, Officer) at the time of the fuel tank maintenance programs.

The appropriate allocation of period of posting and rank was complicated by multiple postings of many individuals. Where possible the information was obtained from DVA, otherwise from AFPEMS searches. For each potentially exposed individual, the year of first exposure was obtained from the DVA F-111 database. This was then categorised into one of five time periods: 1975-1979, 1980-1984, 1985-1989, 1990-1994 and 1995-1999.

The initial study planned for a 5:1 matched ratio for comparison to exposed individuals, however the number of possible comparisons for each exposed individual varied, depending on the characteristics of age category, exposure or posting category and rank category. For some exposed individuals there were fewer than five possible comparisons, while for others there were more. This necessitated the inclusion of all relevant comparisons for this study. This resulted in an overall increase in power for negligible cost. The variability in the ratio of comparison to potentially exposed individuals across strata necessitated weighting of the analysis. Because the Amberley and Richmond comparison groups were obtained independently, it was possible for an individual to be included in both comparison groups.

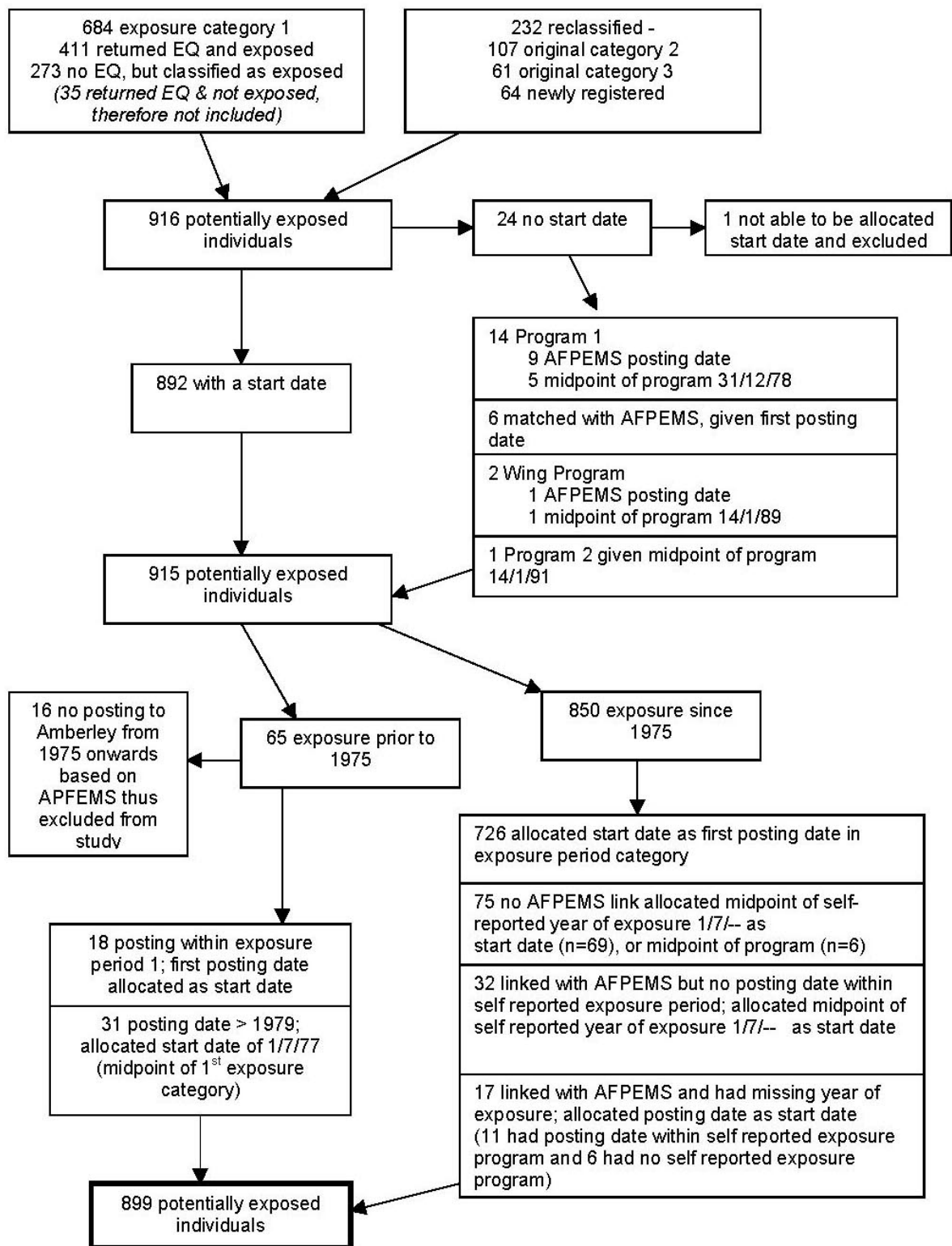
3.3 Allocation of start dates

3.3.1 Allocation for exposed individuals

Data for potentially exposed individuals on the DVA F-111 database were linked to the AFPEMS database and information on postings, ranks, date of birth and gender obtained. Because of problems associated with missing data in the DVA F-111 database, missing AFPEMS data for some individuals, and multiple postings per individual, the process of allocating the start date for calculation of person years at risk was complicated. This process will now be outlined in detail. Refer to Figure 5 for a flow chart illustrating the procedure.

There were 916 potentially exposed individuals eligible for inclusion in the Mortality and Cancer Incidence Study, of which 24 did not have a start date of exposure. Fourteen individuals reported involvement in Program 1, which ran from 1975 to 1982. Nine of these had posting dates within this period and were allocated the first of those posting dates as their start date. A further five individuals had no posting date (n=4) or no posting date within the Program 1 period (n=1) and these individuals were allocated a start date of the mid-point of this program – December 31, 1978. Two individuals reported involvement in the Wing DSRS Program, which ran from 1985 to 1992. One individual had a posting date within this period, which was therefore allocated as the starting date. The second individual had no posting date within this time period and was therefore allocated a start date of the mid-point of this program – January 14, 1989. One individual had reported involvement in Program 2, which ran from 1990 to 1993. This individual had no posting date within this time period and was therefore allocated a start date of the mid-point of this program – January 14, 1991. Six individuals could be matched with the AFPEMS data, and the earliest posting date to Amberley was used as their start date. The last individual did not have a matching AFPEMS record and could not be assigned a start date. This individual was therefore excluded from analyses. This resulted in 915 eligible potentially exposed individuals for analyses.

Figure 5 : The Process of Allocating the Start Date for Potentially Exposed Individuals



Initially, the period of potential exposure was determined to be from January 1975 to December 1999 (based on discussions with DVA and Defence personnel and BOI findings). As the aircraft did not come into service until late 1973, and the first DSRS program (Program 1) did not commence at Amberley until 1977, a start period of 1975 was considered appropriate to cover early maintenance activities at Sacramento. The end period was determined as December 31, 1999 based on time of suspension of the last program, the Spray Seal Program, in January 2000. However, 65 individuals reported an exposure prior to 1975. Since the comparison group only included individuals with a new posting date from January 1, 1975 to December 31, 1999, some of these potentially exposed individuals may not have had an appropriate comparison. Following examination of the APFEMS data, 16 of these 65 individuals were found to have had no postings to Amberley from 1975 onwards, and were thus excluded from analyses. Of the remaining 49 individuals, 18 had a posting date between 1975 and 1979 (exposure period 1). These were then allocated their first posting date in this period as the start date. For the remaining 31 individuals, the start date was allocated as the midpoint of the first exposure category – July 1, 1977. The number of eligible potentially exposed individuals was then reduced to 899.

The procedure for allocation of a start date for the remaining individuals was as follows. For exposed individuals a check was undertaken to determine if there was a posting date within the self-reported exposure period category (1975-1979, 1980-1984, 1985-1989, 1990-1994, 1995-1999). For 726 individuals there was at least one posting date within the exposure period category. For these individuals the first posting date within the exposure period category was allocated as the start date.

Thirty-two individuals were linked with AFPEMS data, but had no posting date within the self-reported exposure period category. A further 69 had no AFPEMS data because they were civilians or service personnel but could not be linked with AFPEMS. For these 101 individuals the midpoint of the self-reported year of exposure (i.e. July 1 of exposure year) was allocated as the start date.

3.3.2 Allocation for comparison individuals

Most individuals in the comparison groups had more than one posting record. It was therefore necessary to select only one posting date for each individual to be used as the start date. The first posting date to Amberley for non-technical comparison group individuals and Richmond for technical comparison individuals was used as their start date. These posting dates were also categorised into one of the five exposure period categories as defined above. This then ensured that the same process for defining the start date was used for exposed and comparison groups. As there was some potential for this method to result in longer observation periods for the comparison group (relative to the potentially exposed cohort) which could bias results away from the null, the analysis was repeated to test for the sensitivity of the methodology. This involved using the last (most recent) posting date for each comparison individual as the start date.

3.4 Allocation of ranks

For the exposed cohort, where the start date had been generated as a posting date from the AFPEMS data, the rank category associated with this posting was used as the appropriate rank category. For the potentially exposed individuals where start date had not been obtained from the posting date, the self-reported rank category recorded in the AFPEMS data was used as the appropriate rank.

There were no ranks for individuals who were civilians, or those service personnel who could not be matched to AFPEMS data. These individuals were randomly allocated a rank, with the number assigned to each rank in the same distribution as for individuals with non-missing rank. For comparison individuals the rank associated with the posting used to allocate start date was used as the appropriate rank classification for comparison individuals.

3.5 Matching for Death

3.5.1 The National Death Index

Data for this study have been taken from the National Death Index (NDI) which is a database maintained by the AIHW containing records of all deaths occurring in Australia since 1980. The Registrars of Births, Deaths and Marriages in each State and Territory supply all data contained in the NDI. The NDI has been designed to contribute to epidemiological studies. There are strict regulations restricting its use only to medical researchers who have obtained ethics approval.

Information about deaths is collected on death certificates, certified by medical practitioners. These death certificates are required by State and Territory Registrars of Births, Deaths and Marriages under jurisdiction specific legislation. These data are collected for legal and health related purposes. On behalf of the Registrars, these data are assembled, coded and published by statistical agencies. These agencies have varied since 1900 and have included State based statistical offices, the Commonwealth Statistician's Office and the Commonwealth Bureau of Census and Statistics, now known as the Australian Bureau of Statistics (ABS). Today, the ABS assembles and codes the death data.

Death certificate information is standardised and coded according to rules set forward in various versions of the International Classification of Diseases (ICD), published by the World Health Organisation (WHO). The deaths are coded to reflect the underlying cause of death - that is "the disease or injury which initiated the train of events leading directly to death or the circumstances of the accident or violence which produced the fatal injury" (5).

The NDI maintains details of individuals including names, date of birth, age at death, gender, marital status and underlying cause of death. Date of death is also recorded, however it has only been recorded in all States and Territories since the mid-1990s with Queensland being the last State to do so. For records post-1997, all contributing causes of death are also listed. The process for data matching with the NDI database was achieved by DVA providing the AIHW with the following variables:

Table 4 : Variables used by AIHW for data matching

| Variables supplied by DVA to AIHW | Information for AIHW: Description and additional information |
|--|--|
| StudyNo | Identification number |
| Family_name | Most recent surname |
| Alt_surname | Alternative Surname (usually previous or maiden surname) |
| First | FirstName |
| Second | SecondName |
| Third | Third and other names |
| Gender | 1 = M 2 = F |
| Birth_date | Formatted dd/mm/yyyy |
| Death_date | Reported date of death provided if known. Formatted dd/mm/yyyy |
| Alive at | Last date of contact or when known to be alive |
| LK_State | Last known State of residence. Includes USA for a few known to be overseas in that country |
| PCode | Australian postcodes used where known. A default field of 9999 indicates that the person was last thought to be overseas |

In accordance with recommendations from the Interim Mortality and Cancer Incidence Study, current or last known postcode and middle names were also supplied for matching purposes.

3.5.2 Matching Criteria for Death

To identify if a study participant had died their personal identifier was compared with the NDI by a trained officer at the AIHW. Matching was carried out using the computer program “Integrity”, a generalised record linkage system for probabilistic record matching which produces lists of likely matches, weighted according to the probability of the matches being true. The matching can only be based on the information available on the files that are being matched. For SHOAMP the information available was surname, given names, gender and date of birth, date of last contact and age at last contact. Date of last contact was obtained from the latest of four dates – start date for posting or attachment, cease date for posting or attachment, start date for change in employment standard or cease date for change in employment standard. For civilians or individuals that could not be matched to AFPEMS records, the date of self reported exposure was used as the date of last contact. The Integrity program assigns a weight for each field considered, including negative weights for mismatches. The software is able to take into account how common the various fields are and is programmed to allow for typographical errors, mis-spellings and date of birth which may vary by one or two years.

After the initial computerised matching a clerical review took place. This allowed for a review of any results the nominated AIHW reviewer felt were not correct, including the detection of Integrity mistakes such as where a father and son received high scores because of a common or similar first name. The clerical review allowed for human judgement of which matches would be accepted or rejected. Criteria for acceptance of a match were:

- Common surname, first name, second name, date of birth, gender; or
- Common variants of names; or
- Transposition of name components; or
- Minor variants in date of birth; or
- First name, second name and date of birth in females that indicate a change of surname (i.e. marriage).

Where a death registration was identified, the cause and date of death was provided to the SHOAMP research team, coded to the International Classification of Diseases, 9th Revision (known as ICD-9) for deaths prior to January 1997 and the International Classification of Diseases, 10th Revision (known as ICD10) after January 1997 (11, 12). Complete information on coded cause of death was available to December 31, 2001.

3.6 Matching for Cancer

In Australia, cancer is a notifiable disease. All Australian States and Territories have statutory requirements for the registration of incident cancers. The registries collect clinical and demographic information about people with newly diagnosed cancer and provide it to the National Cancer Statistics Clearing House at the AIHW for the compilation of national statistics.

3.6.1 Matching for Diagnosis of Cancer

The same matching methodology was used for matching for a diagnosis of cancer as that for death (already described). Where a cancer diagnosis was identified, the topography and histology codes and date of diagnosis were reported to the SHOAMP research team. The cause was coded to the International Classification of Diseases for Oncology, 2nd Edition (ICD10) (13). Complete data on cancer incidence were available to December 31, 2000. Registrations after this date were available for some States only. Therefore Cancer Incidence is only determined to the end of 2000. Causes of cancer were sub-categorised according to those categories used by AIHW in their published cancer data.

3.7 Person-Years at Risk

A person-year is the length of time lived by one person in one year. The number of 'person years at risk' was calculated for all study participants. For the mortality study, persons surviving to December 31, 2001 contribute the time, in years, between their allocated start and the end date of follow-up, December 31, 2001. Persons known to have died before the end date contribute time, in years, between start date and date of death. The same process was used for calculation of cancer person years at risk. Individuals contributed time from start date to diagnosis of first cancer, death or the end of the observation period, December 31, 2000.

3.8 Australian Population Data

3.8.1 Deaths

The Australian population death rates were provided electronically by AIHW. The data included national mortality data by age and sex for specific causes of death or combinations of causes of death (14).

3.8.2 Cancer

The Australian population cancer incidence rates were obtained from the AIHW web site cancer 'data cubes' (15). The data cubes are a multi-dimensional representation of data, which provides facilities for the fast retrieval of information. The cubes provide cancer incidence data for Australia for 1983–2000. The source of these data is the National Cancer Statistics Clearing House at AIHW.

3.9 Definitions of Cancers and Deaths

3.9.1 Deaths

The coded causes of death were classified for the analysis according to the criteria in Table 5.

Table 5 : Coded causes of death

| Deaths | ICD-10 | ICD-9 |
|--|-------------------------------------|--------------|
| Infectious & Parasitic | A00 – A99 & B00 – B99 | 00 - 139 |
| All malignant cancers | C00 – C97 | 140 - 208 |
| Diseases of blood & blood forming organs | D50 – D77 | 280 - 289 |
| Metabolic and Immunity Disorders | E00 – E90 | 240 - 279 |
| Mental Disorders | F00 – F99 | 290 - 319 |
| Nervous system diseases | G00 – G99 | 320 - 359 |
| Cardiovascular diseases | I00 – I99 | 390 - 459 |
| Respiratory system diseases | J00 – J99 | 460 - 519 |
| Digestive system diseases | K00 – K99 | 520 - 579 |
| Genitourinary system diseases | N00 – N99 | 580 - 629 |
| External causes | V00 – V99 W00 – W99 Y00 – Y99 | 800 - 949 |
| Suicide & Self-inflicted Injury | X00 – X99 | 950 - 959 |
| Other external causes | Z00 – Z99 | 960 - 969 |

3.9.2 Cancer

The coded causes of cancer diagnosis were classified for the analysis according to the criteria in Table 6.

Table 6 : Coded causes of cancer diagnosis

| Cancers | ICD 10 Code |
|---|---------------------|
| Head & Neck | C00 – C14 |
| Buccal cavity | C00 – C06 |
| Digestive | C15 – C25, C48 |
| Liver & Pancreas | C22 – C25 |
| Colorectal | C18 – C21 |
| Respiratory | C30 – C38 |
| Bone & connective tissue | C40 – C41, C47, C49 |
| Melanoma of skin | C43 |
| Breast | C50 |
| Genitourinary | C51 – 68 |
| Lymphatic & Haematopoietic | |
| Leukaemias | C91 – C95 |
| Lymphoma | C81 – C85, C96 |
| Multiple myeloma | C86 – C90 |
| Brain & Central Nervous System | C70 - C72 |
| Eye | C69 |
| Other parts of the nervous system & in unspecified organs | C73 – C80, C26, C39 |

3.10 Gender

Since causes of death and incidence of cancer vary between males and females analyses should be conducted separately by gender. The number of females potentially involved in the DSRS programs however was too small to conduct any meaningful analyses (14 females were in category 1 – definitely involved in F-111 DSRS and 8 were classified as having worked in close proximity). Therefore the Mortality and Cancer Incidence analyses were conducted for males only. However, results of the Mortality and Cancer Incidence Study are also likely to apply to females.

3.11 Statistical Analysis

Four methods of analysis were used:

- a) Incidence rate ratio (IRR): The number of first cancers or deaths in each group (i.e. time is censored as first cancer or death) divided by the total person years until first cancer in each group was calculated. The ratio of these incidence rates was used to compare the exposed group to each comparison group.
- b) Incidence density: This is the total number of cancers divided by the total person years at risk, i.e. persons with more than one cancer are NOT censored after their first cancer, and second and third cancers are included. The incidence density is identical to the incidence rate ratio for all cancers, but censored at time of death.
- c) Cox proportional hazards regression for time to first cancer and survival analysis for mortality and adjusted for age group, posting category and rank.
- d) Standardised Mortality Ratios (SMR) and Standardised Cancer Incidence Ratios (SIR) were obtained for the potentially exposed cohort and each of the comparison cohorts (Richmond technical and Amberley non-technical) compared to the Australian population figures separately.

The first three methods were performed separately for first and last eligible posting dates for comparisons using STATA version 7 (16), and were weighted to adjust for age, rank and posting date. The SMRs and SIRs were performed using “Pamcomp”, a Windows application for computing Exact Person-Years, Standardised Mortality Ratios, Standardised Incidence Ratios and Confidence Intervals (17).

Analyses were conducted on all exposed individuals, on those reporting involvement in Program 1, and those reporting involvement in Program 2 separately (i.e. three sets of analyses).

3.11.1 Weighting scheme

To adjust for differences in the distribution of characteristics expected to affect the outcome, sampling weights were calculated. Strata were generated for each of the three cohorts, for the combination of age group, exposure or posting category and rank. Counts in each of these strata were expressed as a percentage of the total number of observations, for each exposure group. The sampling weight for each stratum was then obtained from the ratio of percentages in the exposed cohort relative to the comparison cohort. Comparison strata with no exposed individuals were excluded (prior to calculation of weights). There were seven strata representing 11 individuals (1.3% of the exposed group) with exposed but no comparison counts. Three of these individuals were re-allocated to the next highest posting category; four were re-allocated the next lowest and one the next highest rank category and three were re-allocated the next highest posting and the next lowest rank.

Strata weights are shown in Appendix H. Different weightings were calculated for all exposed individuals, for Program 1 individuals and Program 2 individuals and for comparisons based on first posting date and last posting date.

3.11.2 Calculation of Incidence Rates and Incidence Densities

Incidence rates and incidence densities for each comparison were calculated as the weighted number of cases (first cancer, all cancers, or death) divided by the weighted number of person years at risk.

3.11.3 Calculation of Standardised Incidence Ratio

The Standardised Cancer Incidence Ratios were calculated using the indirect method by:

- Counting the observed number of specific cancers in the group;
- Calculating the number of person years at risk in 5-year age groups for each year between 1983 and 2000⁷;
- Calculating the expected number of cancers by applying Australian age specific incidence rates to the study group's person years at risk;
- Calculating the ratio of observed to expected number of cancers; and
- Calculating the exact 95 percent Confidence Intervals using the method described by Rothman (18, p210-211).⁸

3.11.4 Calculation of Standardised Mortality Ratio

The Standardised Mortality Ratios were calculated in a similar way by:

- Counting the observed number of deaths in the group;
- Calculating the number of person years at risk in 5-year age groups for each year between 1975 and 2000;
- Calculating the expected number of deaths by applying Australian age specific death rates to the study group's person years at risk;

⁷ Australian population data is not available prior to 1983, therefore analysis of comparison with Australian population calculated from 1983 to 2000.

⁸ This iterative method calculates exact Fisher limits with each strata and pools the result.

- Calculating the ratio of observed to expected number of deaths; and
- Calculating the exact 95 percent Confidence Intervals using the method described by Rothman (18, p210-211).

4 RESULTS

Of the 899 potentially exposed individuals eligible for inclusion in the current Mortality and Cancer Incidence Study, 22 were female; this number was too small to study as a group and their data were not included here. A further four had missing age and were also excluded. This left 873 potentially exposed individuals who were included and used for selection of the comparison groups. Of these 873, 62 had missing rank and were randomly assigned a rank (for the purposes of obtaining appropriate comparisons). The final cohort included 17,858 persons: 873 exposed, 7577 Amberley comparisons and 9408 Richmond comparisons. Table 7 shows the characteristics of individuals included in the Mortality and Cancer Incidence Study (for first posting date). As expected, due to the selection process, larger numbers of individuals are in the earlier, rather than later Exposure / Posting Category. The most common age groups are 35-39 years, 40-44 years and 45-59 years. There were 277 individuals who were included in both Amberley and Richmond comparison groups. Appendix I shows the characteristics for individuals selected using the last (most recent) posting date.

There were 434 individuals with a diagnosis of cancer. Twenty individuals had a cancer diagnosed before their allocated start date, that is before they were deemed to be at risk. These cancers were therefore considered not relevant for the purposes of this study. Two of these individuals had a second cancer which was also diagnosed prior to start date and excluded from the study. Of the remaining individuals 23 had a second cancer, and one had a third. One individual had a non-melanocytic skin cancer, which was excluded as these are not usually recorded by Australian cancer registries.

**Table 7 : Characteristics of Mortality and Cancer Incidence Study
Subjects, Selected Using First Posting Date**

| | All Exposed N = 873 | | Program 1 N = 389 | | Program 2 N = 302 | | Amberley comparison N = 7577 | | Richmond comparison N = 9408 | |
|------------------------------------|--------------------------------|----------|------------------------------|----------|------------------------------|----------|---|----------|---|----------|
| | n | % | n | % | n | % | n | % | n | % |
| AGE GROUP | | | | | | | | | | |
| 20-24 | 1 | 0.1 | | | | | 154 | 2 | 75 | 1 |
| 25-29 | 40 | 5 | 1 | 0.3 | 14 | 5 | 614 | 9 | 610 | 6 |
| 30-34 | 111 | 13 | 6 | 2 | 60 | 20 | 834 | 11 | 1421 | 15 |
| 35-39 | 163 | 19 | 39 | 10 | 75 | 25 | 1105 | 15 | 1600 | 17 |
| 40-44 | 183 | 21 | 94 | 24 | 52 | 17 | 1264 | 17 | 1846 | 20 |
| 45-49 | 175 | 20 | 110 | 28 | 47 | 16 | 1115 | 15 | 1545 | 16 |
| 50-54 | 99 | 11 | 64 | 16 | 25 | 8 | 1014 | 13 | 1147 | 12 |
| 55-59 | 59 | 7 | 46 | 12 | 17 | 6 | 706 | 9 | 670 | 7 |
| 60-64 | 23 | 3 | 12 | 3 | 8 | 3 | 490 | 6 | 271 | 3 |
| 65-69 | 15 | 2 | 14 | 4 | 4 | 1 | 197 | 3 | 148 | 2 |
| 70-75 | 4 | 0.5 | 3 | 1 | | | 84 | 1 | 75 | 1 |
| EXPOSURE / POSTING CATEGORY | | | | | | | | | | |
| 1975-79 | 285 | 33 | 236 | 61 | 42 | 14 | 1836 | 24 | 2267 | 24 |
| 1980-84 | 199 | 23 | 131 | 34 | 54 | 18 | 1727 | 23 | 2147 | 23 |
| 1985-89 | 204 | 23 | 18 | 5 | 118 | 39 | 1758 | 23 | 2217 | 24 |
| 1990-94 | 118 | 14 | 1 | 0.3 | 78 | 26 | 1161 | 15 | 1604 | 17 |
| 1995-99 | 67 | 8 | 3 | 1 | 10 | 3 | 1095 | 14 | 1173 | 12 |
| RANK [∞] | | | | | | | | | | |
| Enlisted | 575 | 66 | 244 | 63 | 207 | 69 | 4524 | 60 | 5881 | 63 |
| Non-Comm Off | 269 | 31 | 133 | 34 | 86 | 28 | 2090 | 28 | 3043 | 32 |
| Officer | 29 | 3 | 12 | 3 | 9 | 3 | 963 | 13 | 484 | 5 |

[∞] 62 individuals in the exposed group with missing rank were randomly allocated a rank (in the same distribution of ranks for the remainder of the group) for the purposes of matching and analysis.

Percentages may not add to 100 exactly due to rounding. For Program 1 and Program 2 analyses had different numbers of comparisons and therefore different weightings were used (see Appendix H). "All Exposed" includes those in Programs 1, 2, Wing, and Spray Seal.

Because cancer information was incomplete after December 31, 2000 the six cancers diagnosed after this date were not included in analyses, providing 407 individuals with cancer for these analyses. There were 487 deaths and 43 individuals with a date of death after December 31, 2001, the last date for which complete death registration data from all States was available in the NDI; therefore these deaths were also excluded from analyses. Thirteen individuals had a date of death prior to their allocated start date, and these deaths were excluded from the study.

4.1 Cancer incidence

There were 407 individuals with a diagnosis of cancer, and 431 cancers in total included in the analysis. Table 8 details the distributions and causes of cancer in each of the three groups (all exposed, Amberley comparison and Richmond comparison) plus the Program 1, Program 2 and other exposed subgroups. The observed (unweighted) and weighted numbers of cancers and unweighted and weighted person years in each group are also shown in Table 8. The weighted cancer incidence rate ratios are provided in Table 9. As shown, the Cancer Incidence Rate Ratio point estimates are consistently in the range of 1.4-1.5 regardless of comparison group, choice of first or last eligible posting for controls, or subgroup analysis. Six of these comparisons reach a formal level of statistical significance. Table 9 also presents the survival analysis, which takes into account the time to the development of a first cancer. As expected these results are very similar to the Incidence Rate Ratios. Table 10 presents the age standardised cancer incidence ratios for the exposed and comparison groups relative to the Australian population (see Appendix J for comparison of site-specific cancers to the Australian population). The Standardised Incidence Ratio for the exposed group is elevated at 148, and this is of borderline statistical significance (95% CI= 98-216).

4.2 Mortality

There were 431 observed deaths included in the analyses. Table 11 indicates the distributions and causes of death in each of the three groups (all exposed, Amberley comparison, and Richmond comparison) plus the Program 1, Program 2 and other

exposed subgroups. The observed (unweighted) and weighted numbers of deaths and unweighted and weighted person years in each group are also shown in Table 11. The weighted mortality rate ratios are provided in Table 12. As shown, these rate ratios are consistently and significantly less than one, in the vicinity of 0.2 to 0.45, indicating a paradoxical decrease in mortality in the DSRS exposed group, regardless of comparison group, first or last control posting, or subgroup. These results are also consistent with those of the survival analyses (Table 12) and comparison with the Australian population (Table 13 and Appendix K). We discuss this paradoxical finding in the next section.

Table 8 : Observed (Unweighted) Numbers of Cancers, Total and Sub-Types, in each Group and Weighted Group Totals

| Cancers | All Exposed | Program 1 | Program 2 | Other Exposed | Amberley comparison | Richmond comparison |
|----------------------------|--------------------|------------------|------------------|----------------------|----------------------------|----------------------------|
| Head & Neck | 3 | 1 | 2 | 0 | 15 (17) | 12 (13) |
| Buccal cavity | 2 | 1 | 1 | 0 | 11 (12) | 8 |
| Digestive | 6 | 4 | 0 | 2 | 35 (40) | 28 (33) |
| Liver & Pancreas | 0 | 0 | 0 | 0 | 2 | 6 (7) |
| Colorectal | 6 | 4 | 0 | 2 | 28 (31) | 15 (18) |
| Respiratory | 2 | 2 | 0 | 0 | 20 (21) | 11 (13) |
| Bone & connective tissue | 0 | 0 | 0 | 0 | 7 (10) | 4 |
| Melanoma of skin | 7 | 6 | 1 | 1 | 39 (40) | 47 (48) |
| Breast | 1 | 1 | 0 | 0 | 0 | 0 |
| Genitourinary | 4 | 2 | 2 | 0 | 44 (45) | 41 |
| Lymphatic & Haematopoietic | 2 (3) | 1 | 1 | 1 (2) | 18 | 23 (24) |
| Leukaemias | 1 | 1 | 1 | 0 | 6 | 6 |
| Lymphoma | 1 (2) | 0 | 0 | 1 (2) | 12 | 13 (14) |
| Multiple myeloma | 0 | 0 | 0 | 0 | 0 | 4 |

Table 8 continued...

| Cancers | All Exposed | Program 1 | Program 2 | Other Exposed | Amberley comparison | Richmond comparison |
|---|--------------------|------------------|------------------|----------------------|----------------------------|----------------------------|
| Brain & Central Nervous System | 0 | 0 | 0 | 0 | 4 | 9 |
| Eye | 1 | 0 | 1 | 0 | 1 | 2 |
| Other parts of the nervous system & other cancers | 1 | 1 | 0 | 0 | 11 | 9 |
| Total (unweighted) | 27 (28) | 18 | 7 | 4 | 194 (207) | 186 (196) |
| Total (weighted) | 27 (28) | 18 | 7 | 4 | 151 (163) | 195 (205) |
| Person years (unweighted) | 14526 | 8259 | 4316 | 3383 | 111611 | 139724 |
| Person years (weighted) | 14526 | 8259 | 4313 | 3383 | 122734 | 152291 |

- *Based on comparisons using first posting date*
- *Numbers for first cancer only (with numbers in parentheses representing all cancers)*
- *Numbers in Program 1, Program 2 and other exposed do not add up to total cancers, as some participants were involved in both Program 1 and 2.*

Table 9 : Incidence Rate Ratios and Hazard ratios for Cancer (weighted analysis)

| | Comparison | Incidence Rate Ratio (95% CI) | | Hazard Ratio (95% CI) | |
|----------------------|------------------------------|-------------------------------|----------------------|-----------------------|----------------------|
| | | Control first posting | Control last posting | Control first posting | Control last posting |
| First Cancer | All Exposed vs Amberley Comp | 1.51 (0.96-2.29) | 1.62 (1.03-2.47)* | 1.44 (0.95-2.17) | 1.43 (0.93-2.18) |
| | All Exposed vs Richmond Comp | 1.45 (0.93-2.18) | 1.60 (1.02-2.41)* | 1.51 (1.01-2.27)* | 1.53 (1.01-2.32)* |
| | Program 1 vs Amberley Comp | 1.55 (0.89-2.53) | 1.73 (0.99-2.87) | 1.42 (0.86-2.33) | 1.57 (0.93-2.63) |
| | Program 1 vs Richmond Comp | 1.55 (0.90-2.51) | 1.67 (0.96-2.74) | 1.54 (0.94-2.52) | 1.56 (0.94-2.60) |
| | Program 2 vs Amberley Comp | 1.49 (0.58-3.18) | 1.49 (0.58-3.20) | 1.59 (0.74-3.42) | 1.45 (0.67-3.13) |
| | Program 2 vs Richmond Comp | 1.27 (0.50-2.67) | 1.51 (0.59-3.20) | 1.42 (0.66-3.05) | 1.40 (0.65-3.01) |
| All Cancers # | All Exposed vs Amberley Comp | 1.45 (0.93-2.17) | 1.56 (1.002-2.36)* | N/A | |
| | All Exposed vs Richmond Comp | 1.43 (0.93-2.13) | 1.55 (1.004-2.32)* | | |
| | Program 1 vs Amberley Comp | 1.41 (0.81-2.29) | 1.62 (0.92-2.68) | | |
| | Program 1 vs Richmond Comp | 1.44 (0.84-2.34) | 1.55 (0.90-2.54) | | |
| | Program 2 vs Amberley Comp | 1.41 (0.55-3.00) | 1.34 (0.53-2.89) | | |
| | Program 2 vs Richmond Comp | 1.21 (0.48-2.55) | 1.43 (0.56-3.04) | | |

* $p < 0.05$

Incidence Rate Ratio for all cancers is equivalent to the incidence density

Table 10 : Standardised incidence ratio for cancer compared to the Australian population, 1983–2000

| Population | Observed | Expected | Standardised Incidence Ratio | 95% Confidence Interval ♦ |
|---|-----------------|-----------------|-------------------------------------|----------------------------------|
| F-111 Exposed vs Australian Population | 27 | 18.2 | 148.4 | 97.77 - 215.84 |
| Amberley comparisons vs Australian Population | 193# | 192.9 | 100.1 | 86.43 - 115.21 |
| Richmond comparisons vs Australian Population | 184 | 194 | 94.6 | 81.89 - 109.32 |

♦ *Calculated using the exact method*

Excludes one cancer which occurred in 1982

Table 11 : Observed (Unweighted) Numbers of Deaths, Total and Sub-Types in each Group and Weighted Group Totals

| Deaths | All Exposed | Program 1 | Program 2 | Other Exposed | Amberley comparison | Richmond comparison |
|---------------------------------------|--------------------|------------------|------------------|----------------------|----------------------------|----------------------------|
| Infectious & Parasitic | 0 | 0 | 0 | 0 | 2 | 0 |
| All malignant cancers | 6 | 2 | 1 | 3 | 61 | 63 |
| Blood Diseases | 0 | 0 | 0 | 0 | 1 | 1 |
| Metabolic and Immunity Disorders | 0 | 0 | 0 | 0 | 7 | 4 |
| Mental Disorders | 0 | 0 | 0 | 0 | 2 | 2 |
| Nervous system diseases | 0 | 0 | 0 | 0 | 4 | 2 |
| Cardiovascular diseases | 1 | 1 | 0 | 0 | 49 | 48 |
| Respiratory system diseases | 0 | 0 | 0 | 0 | 9 | 2 |
| Digestive system diseases | 2 | 0 | 1 | 1 | 6 | 4 |
| Genitourinary system diseases | 0 | 0 | 0 | 0 | 1 | 0 |
| External (accidental) causes of death | 0 | 0 | 0 | 0 | 23 | 57 |
| Suicide & Self-inflicted Injury | 0 | 0 | 0 | 0 | 23 | 38 |
| All other external causes | 0 | 0 | 0 | 0 | 1 | 0 |
| Other | 0 | 0 | 0 | 0 | 2 | 4 |
| Total (unweighted)* | 9 | 3 | 2 | 4 | 194 | 228 |
| Total (unweighted) | 9 | 3 | 2 | 4 | 173 | 227 |
| Person Years (unweighted) | 15506 | 8714 | 4663 | 3649 | 119904 | 149676 |
| Person Years (weighted) | 15506 | 8714 | 4663 | 3649 | 130821 | 162320 |

* Three individuals in each of the Amberley and Richmond comparison groups had uncoded causes of death.

Table 12 : Mortality Rate Ratio (weighted analyses)

| | Comparison | Mortality Rate Ratio (95% CI) | | Hazard Ratio (95% CI) | |
|---------------|------------------------------|-------------------------------|----------------------|-----------------------|----------------------|
| | | Control first posting | Control last posting | Control first posting | Control last posting |
| Deaths | All Exposed vs Amberley Comp | 0.44 (0.20-0.85) | 0.35 (0.16-0.67) | 0.44 (0.23-0.87) | 0.36 (0.18-0.72) |
| | All Exposed vs Richmond Comp | 0.42 (0.19-0.80) | 0.33 (0.15-0.63) | 0.41 (0.21-0.80) | 0.36 (0.18-0.70) |
| | Program 1 vs Amberley Comp | 0.21 (0.04-0.63) | 0.17 (0.04-0.52) | 0.22 (0.07-0.69) | 0.17 (0.06-0.55) |
| | Program 1 vs Richmond Comp | 0.23 (0.05-0.69) | 0.21 (0.04-0.62) | 0.22 (0.07-0.70) | 0.21 (0.07-0.66) |
| | Program 2 vs Amberley Comp | 0.37 (0.04-1.38) | 0.28 (0.03-1.04) | 0.43 (0.10-1.74) | 0.34 (0.08-1.38) |
| | Program 2 vs Richmond Comp | 0.32 (0.04-1.18) | 0.22 (0.03-0.80) | 0.33 (0.08-1.34) | 0.27 (0.07-1.10) |

Table 13 : Standardised mortality ratio compared to the Australian population, 1980-2001

| Population | Observed | Expected | Standardised Mortality Ratio | 95% Confidence Interval ♦ |
|---|-----------------|-----------------|-------------------------------------|----------------------------------|
| F-111 Exposed vs Australian Population | 9 | 30.1 | 29.9 | 13.66 - 56.74* |
| Amberley comparisons vs Australian Population | 194 | 290.1 | 66.9 | 57.79 – 76.98* |
| Richmond comparisons vs Australian Population | 228 | 309.3 | 73.7 | 64.45 - 83.92* |

* $p < 0.05$

♦ *Calculated using the exact method*

5 DISCUSSION

The changes suggested in the Interim Mortality and Cancer Incidence Study report, including the provision of middle names and an additional year of follow-up, led to a significant increase in the number of cancer and mortality events and linkages, leading to increased power. The Interim Mortality and Cancer Incidence Study included 352 individuals with cancer and 183 deaths, whereas the current study included 407 individuals with cancer and 431 deaths. The multiple analyses, including Incidence Rate Ratios, Incidence Density, Cox proportional hazards regression, and standardised rates compared to the Australian population provide the opportunity to examine the consistency of the results. Similar results with the different methods bolster our confidence in their validity, although this corroborative evidence is not as strong as corroborative evidence from totally independent studies.

5.1 Cancer

The point estimates of the Cancer Incidence Rate Ratios, incidence densities, and SIRs are all consistently increased, although only six of these comparisons formally reach statistical significance at the $p < 0.05$ level. Before attributing the results to a true increase in cancer, one must first explore the possibility of bias and the evidence for causation.

5.1.1 Sources of bias

1. Survivor bias

There is a consistent and statistically significant decrease in mortality in the exposed group. This is consistent across subgroups, choice of first or last posting dates for controls, comparisons with Australian population and analysis type. The most likely explanation for this is survival bias, i.e. despite best efforts it was not possible to

identify DSRS participants who had died before the start of the study, leading to a falsely low mortality in the exposed group. This is supported by the low SMR relative to the Australian population, and the lower SMR in the exposed group (~30%) than in either of the comparison groups (~70%). Although one would expect a lower SMR in Air Force personnel due to the physical fitness entry requirements (and indeed this is shown by the SMR of ~70% in the Amberley and Richmond comparisons) one would not expect those involved in DSRS activities to have a lower mortality than their companions at the same or another Base. The lower SMR in the exposed group, i.e. 30%, suggests missing mortality data. Additional support for the presence of survivor bias is the fact that there are many common causes of mortality that are either under-represented or not represented at all in the exposed group when compared to the Australian population. This indicates that deaths due to cancer were over-represented in the study; despite this, there are probably many cancer deaths that are still missing since the cancer death rate ratio (0.7) is still not commensurate with the cancer incidence rate ratio (1.5).

This survivor bias is mainly due to the lack of a definitive sampling frame of all individuals involved in the F-111 DSRS program(s). There was no definitive list of DSRS participants compiled at the time that the work was carried out, and DSRS activities were not comprehensively noted in participants' personnel files. Only 40 individuals from the list of 719 classified as having been involved in F-111 DSRS (according to DVA F-111 list) were found to have such a notation in their file. All attempts to define a sampling frame are therefore retrospective, and a number of possibilities were considered:

- a) A search of all paper records for all individuals posted to Amberley RAAF Base during the time that DSRS programs and activities could be conducted. This would involve searching over 10,000 files, and DVA and Defence staff considered it unwieldy to undertake the work, as well as unlikely that all individuals involved would have a notation in their files.
- b) Use of a code identifying individuals who had undertaken a confined space entry course. It was suggested that individuals working inside F-111 fuel tanks should

have completed this course. However this may not have been the case, and all Air Force personnel who had undertaken this course would certainly not have been involved in F-111 DSRS activities. It was also unclear how far back this code would have been relevant. In addition, not all individuals potentially involved in DSRS would have undertaken this course, since not all activities of interest required fuel tank entry.

- c) Other methods include trying to determine musterings and/or postings specific to DSRS, including the use of additional payment for tank entry. None were considered useful/appropriate, because records were no longer available or were not comprehensive.

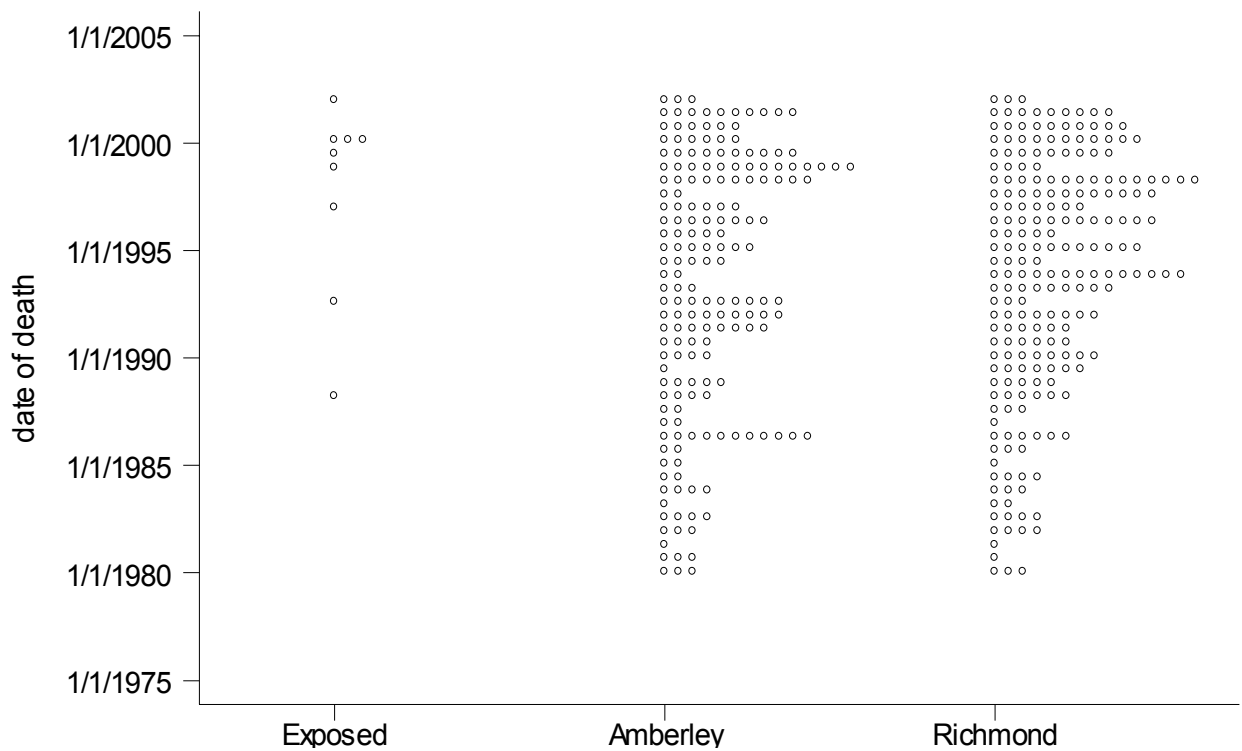
Is there any way to correct for this survivor bias? One possibility is to try to estimate the number of deaths that were missed. One can approximate this number by looking at the SMR for the exposed group (~30%) relative to the Richmond comparison (~70%). Since it is reasonable to assume that these technical trades people should be as healthy as their colleagues, we can estimate the real number of deaths as being 70%/30% or ~2.3 fold higher. This means that the actual number of deaths could have been 9 x 2.3 or 21. What proportion of these would have been cancer deaths? The estimates can range from a high of 67% (6/9 of the ascertained deaths were from cancer) to a low of 28% (63/228 of the deaths in the Richmond comparison group were from cancer), with which we can perform a sensitivity analysis. The above estimates yield a range of cancer deaths from six to 14, of which six have already been identified. Adding these 0-8 additional cancers to the 27 cancers already identified leads to the IRRs in Table 14.

Table 14 : Weighted cancer results corrected for survivor bias (sensitivity analysis)

| | Incidence rate ratios | |
|---|-----------------------|----------------------|
| | Control first posting | Control last posting |
| First cancers: exposed vs Amberley | 1.51 to 1.92 | 1.62 to 2.09 |
| First cancers: exposed vs Richmond | 1.45 to 1.87 | 1.60 to 2.05 |

An additional way to estimate survivor bias is to tabulate dates of death. If the distribution of deaths were different between the exposed and comparison groups, one would suspect some bias. Date of death for each group are shown in Figure 6. Since there are only nine deaths it is difficult to gauge whether the distributions are similar (however they do not appear to be dissimilar). Results for last posting date were almost identical.

Figure 6 : Distribution of death dates for exposed and comparison groups using first posting



II. Selection/volunteer bias

One possible explanation for the increased rate of cancer is the presence of selection or volunteer bias. It is possible that of all those involved in DSRS activities, those with health problems or cancers tended to participate more. This may then produce a bias away from the null, whereby those of the exposed cohort who are included in the study are, in general, in poorer health than F-111 DSRS individuals overall.

There are a number of potential methods for ascertaining the presence or magnitude of this bias:

- a) One potential solution to ascertaining selection or volunteer bias is to “bias” the comparisons using the same “filter” that applied to those who were included in the exposed group; the resulting analysis would remove any selection bias. This “filter” is that people had to be alive from 1999 onwards in order to respond to recruitment ads, and that they were motivated to call in to the DVA Hotline. Although the first part of this filter is easy to reproduce, the second is not. If we assume that the presence of symptoms might motivate a person to respond to an advertisement, one possible solution for future consideration is to use the questionnaire of self-reported signs and symptoms in Phase III of SHOAMP, the General Health and Medical Study. It may be possible to select a number of symptoms that are generally agreed not to be directly linked to DSRS exposure, and to use the number of these reported as a measure of the “somatic tendency” of the person, and the likelihood that they would participate in the study. Comparisons could be matched with cases that have the same number of symptoms to see if this changes the estimates obtained. Any attenuation of the relative risks would indicate the presence of selection/volunteer bias and the degree of attenuation would indicate the magnitude of the bias.
- b) Another method is to compare those who responded immediately to the study invitation versus those who only responded after follow-up calls and reminders. If those who were sicker were more motivated to respond, then one should see differing characteristics between the two groups. Unfortunately, these data are not easily accessible on the DVA software system used to track recruitment.

- c) A third possibility is based on the capture-recapture method in which exposed people identified using two different (supposedly independent) methods (e.g. via friends or via call-in to Hotline) are used to estimate a “dilution factor”; this dilution factor is then used to estimate the size of the original population of exposed people. However the assumption of independence crucial to this method is unlikely to be met in this study.
- d) Another way is to track only incident cases of cancer dating from the start of recruitment in this study. This however would require another 10-15 years of follow-up from the present and would not give us a timely answer.
- e) Similar to option (a), another option is to bias the cases in the same way in which comparisons are biased. This method rests on the fact that not all people who were identified as exposed were traceable on the AFPEMS database. This means that people with cancer who were in the exposed group but not on AFPEMS were counted in the results, whereas no such opportunity was given to those in the comparison group with cancer not on AFPEMS; this would have led to more cancers in the exposed group. This bias can be eliminated by restricting the analyses to those in the exposed group who also appear on AFPEMS. Data for this re-analysis are shown in Table 15.

Table 15 : Weighted cancer results corrected for selection bias (restricting analysis to those in the exposed group on AFPEMS)

| | | Incidence rate ratios | |
|---|--------------------------|-----------------------|----------------------|
| | | Control first posting | Control last posting |
| First cancers: exposed vs Amberley | Original estimate | 1.51 (0.96-2.29) | 1.62 (1.03-2.47) |
| | Adjusted estimate | 1.46 (0.91-2.27) | 1.59 (0.98-2.47) |
| First cancers: exposed vs Richmond | Original estimate | 1.45 (0.93-2.18) | 1.60 (1.02-2.41) |
| | Adjusted estimate | 1.41 (0.88-2.17) | 1.55 (0.96-2.38) |

f) One final possibility is to estimate the degree of selection bias that would need to be present to have moved the cancer incidence point estimate so far away from one. We know that the Richmond group came from a complete sampling frame; out of 9408 people contributing 152,291 (weighted) person years of observation, 195 (weighted) cancers were documented, an incidence of 0.0012804 cancer/person year. The exposed group comprised 873 people contributing 14,526 person years of observation and 27 cancers were documented, an incidence of 0.0018587 cancer/person year. If this higher incidence were due simply to participation bias, and in fact the incidence was identical, the person years in the exposed group would have to be 21,086. Given that each exposed person contributes on average 16.6 years of observation, this translates into 1267 people in the exposed sampling frame, of which 873 were already identified; hence, the remainder, 394 healthy people (or 31%), would have had to be missed to create this degree of bias. If we repeat these calculations including the eight cancers that we estimated had been missed due to survivor bias (see section above), then 1643 people would have had to be exposed. Since 873 were already identified, this means that 770 healthy people (47%) would have had to be missed to create this degree of bias. In other words, the study would have had to miss one-third to one-half of all participants in order to create a sufficient bias to account for these results. We believe that selection bias of this magnitude is unlikely to have occurred. The effect of lesser degrees of participation bias on the incidence rate ratio is outlined in Table 16.

Table 16 : Effect of participation bias on the incidence rate ratio

| Degree of selection bias | Incidence rate ratio adjusted for selection bias | Incidence rate ratio adjusted for selection bias and survivor bias |
|--------------------------|--|--|
| 10% | 1.31 | 1.69 |
| 15% | 1.23 | 1.60 |
| 20% | 1.16 | 1.51 |
| 25% | 1.09 | 1.41 |
| 30% | 1.02 | 1.32 |

The last column in Table 16 describes the combined effect of survivor bias and selection bias. Survivor bias shifts results towards the null, whereas selection bias shifts results away from the null. These estimations indicate that reasonably large selection bias is still insufficient to fully account for the higher incidence of cancer; the biases would tend to cancel each other out and a higher incidence of cancer in the exposed group is apparent.

Another form of selection bias is the inclusion of subjects who were not truly exposed. As mentioned previously, exposure category was based mainly on self-report. Due to the possible perceived benefit from being labelled “exposed”, either because of free health care through the F-111 DSRS Interim Health Care Scheme, or because of possible legal proceedings against the Air Force, there may be a perceived inducement to claim exposure. We believe this type of bias would not be responsible for the higher cancer incidence in the exposed group because:

- a) Participation in a program was cross-checked with posting records to the appropriate Base at the appropriate time; and
- b) If anything this bias would tend towards the null, minimising any possible difference.

Another possible source of selection bias is that it was not possible to obtain community comparisons for the civilians who were classified as having been involved in DSRS programs or activities. An appropriate method for obtaining relevant comparisons would require obtaining details of individuals living in Ipswich, and of the same age and gender, at the time the potentially exposed individuals were involved in DSRS. This would have required obtaining electoral roles from 1977 to 1999, and sampling from these. This was determined to be non-feasible. Therefore Defence personnel of the same age and gender were used for comparisons. Given that our data supports the “Healthy Soldier” effect – i.e. that individuals in the Military may have better health than other workers, because of strict entry requirements and the necessity that Military personnel maintain a reasonable level of fitness throughout their enlistment period – the inclusion of civilians matched to Defence comparisons would have caused a bias away from the null, since it would include people in “poorer” health selectively in the exposed group. Given that only 27 civilians were

eligible for the Mortality and Cancer Incidence Study, and that the civilians were undertaking similar technical activities as the Defence personnel, the magnitude of this bias should be negligible.

III. Diagnostic suspicion bias

Another possible bias is diagnostic suspicion bias. This means that even if all those who were exposed participated in the study, it is possible that because of their immediate symptoms and the traumatic nature of the exposure, they presented to medical attention more frequently and hence had their cancers diagnosed at an earlier date and stage. Notably, the survival analysis, which takes into account time to event, did not yield different results than the incidence density or incidence rate methods. In other words, there was not evidence from this source of a shift in time of diagnosis.

Another possible method of detecting this diagnostic suspicion bias is to check on the stage of the cancer at the time of diagnosis; if this bias were present we would expect those in the exposed group to have fewer metastatic cancers at diagnosis than those in the control group. However, information on cancer staging was not obtained for this study.

IV. Ascertainment bias

Ascertainment bias is also possible. Complete coded death data were only available for deaths registered from 1980 up to 2001. Complete Cancer Incidence data were only available from 1982 up to December 2000. This is due to a time lag between diagnosis and registration, the considerable amount of time taken to clean and check the cancer registration data and that data are provided by the State and Territory Registries on an annual basis only. Although this means that more recent deaths and cancers are not included, this occurs equally for both exposed and comparison groups and should not cause any bias. However the lag time between the start of exposure (1975) and the start of cancer and mortality surveillance (1982 and 1980 respectively) may cause some bias. If the effect of exposure to DSRS activities is to

speed up the occurrence of cancer, then there may have been some early cancers in the exposed group that were missed; this in fact would bias results towards the null, making the present evidence of an elevated cancer risk in the exposed group more compelling.

5.1.2 Other considerations in establishing causation

There are a number of other issues in gauging the validity of our results:

a) Rule out confounding

Because the Mortality and Cancer Incidence Study involved record linkage of computerised data obtained from AFPEMS and the DVA F-111 list, no information on confounders or risk factors for mortality or cancer was available. It is possible that the increased risk of cancer in the DSRS group is actually due to another concurrent exposure in this group, for example smoking or poor nutrition. We can get some indication of confounders in this group by looking at the subset of participants who took part in the General Health and Medical Study (Phase III). Table 17 shows the distribution of confounders, such as Body Mass Index (BMI), smoking, alcohol, and education. Although there are significant differences, sometimes these differences are against the Amberley comparison group, sometimes against the Richmond comparison group and sometimes favour the exposed, sometimes the comparison. If the relationship between exposure and cancer was confounded by one of these factors, we would expect the IRR to vary between the Richmond and Amberley comparison groups, but in fact they are very similar. Age, posting and rank are not confounding the results since the analyses have already adjusted for these factors.

Table 17 : Differences between groups according to study confounders

| | Amberley | | Richmond | | Exposed | |
|------------------------------------|------------|------------|------------|------------|------------|------------|
| | N | % | N | % | N | % |
| Total | 406 | 100 | 516 | 100 | 616 | 100 |
| EDUCATION | | | | | | |
| Primary school or some high school | 84 | 21 | 17 | 3.3 | 37 | 6.0 |
| Completed high school | 109 | 27 | 22 | 4.3 | 37 | 6.0 |
| Trade/Apprenticeship | 47 | 12 | 228 | 44 | 249 | 40 |
| Certificate/Diploma | 108 | 27 | 175 | 34 | 206 | 33 |
| University degree | 48 | 12 | 65 | 13 | 60 | 10 |
| Unknown | 10 | 2.5 | 9 | 1.7 | 27 | 4.4 |
| BMI* | | | | | | |
| Underweight | 1 | 0.3 | 1 | 0.2 | 12 | 1.9 |
| Normal weight range | 60 | 15 | 87 | 17 | 126 | 20 |
| Overweight | 186 | 46 | 252 | 49 | 294 | 48 |
| Obese | 147 | 36 | 166 | 32 | 180 | 29 |
| Grossly obese | 12 | 2.9 | 9 | 1.7 | 4 | 0.6 |
| DRINKER TYPE | | | | | | |
| Former hazardous drinker | 13 | 3.2 | 6 | 1.2 | 21 | 3.4 |
| Hazardous drinker bingeing | 128 | 31 | 150 | 29 | 177 | 29 |
| Hazardous drinker chronic | 25 | 6.2 | 31 | 6.0 | 36 | 5.8 |
| Moderate | 62 | 15 | 109 | 21 | 139 | 23 |
| Safe drinker | 169 | 42 | 210 | 41 | 216 | 35 |
| Teetotaller | 1 | 0.3 | 0 | 0 | 2 | 0.3 |
| Unknown | 8 | 2.0 | 10 | 2.0 | 25 | 4.1 |
| SMOKING CATEGORIES | | | | | | |
| Current smoker | 98 | 24 | 71 | 14 | 120 | 19 |
| Ex smoker | 153 | 38 | 193 | 37 | 229 | 37 |
| Never smoked | 149 | 37 | 244 | 47 | 242 | 39 |
| Unknown | 6 | 1.5 | 8 | 1.6 | 25 | 4.1 |

Percentages may not add to 100 exactly due to rounding

** One person from the Richmond comparison group did not have weight recorded so N=515*

Another confounder is military exposures and civilian exposures before entry into, and following discharge from, the Air Force. For example, individuals in a technical trade may have been exposed to a considerable range of potentially harmful substances or activities. These may include jet fuel, solvents and other chemicals. We believe that the possibility of confounding is low given that results for the Amberley and Richmond comparison groups are consistent; one would expect the level of confounding between similar musterings and activities (Richmond group) and different musterings with different activities (Amberley group) to lead to different IRRs, which is not what is seen. Nevertheless, this possibility will be investigated further in the Phase III study, in which a Job Exposure Matrix (JEM) will be used to estimate civilian exposures to environmental toxins.

b) Establish a dose-response curve

Causation is supported if there is a relationship between increasing exposure and increasing cancer incidence. Five hundred and twelve of those in the exposed group included in this report also participated in Phase III of the study in which detailed information on length of participation in the DSRS programs was obtained. Analysing only this subgroup allows us to construct a dose-response curve with regard to cancer incidence, although this will be qualified by the small numbers available. “Dose” of the program for a person was calculated as total months across all programs in which that person was involved. The resulting dose was divided into tertiles, equating to roughly less than 9 months, 9 to less than 30 months, and 30 months or greater of involvement in DSRS programs. Results are shown in Table 18.

Although the point estimates do not suggest a dose-response relationship, the number of cancers is low, and confidence intervals overlap considerably, hence we do not have sufficient power to draw any conclusions. Phase III of the study will also explore a dose-response relationship with a number of other outcomes, e.g. neuropsychological, physiological, etc, and it may be informative to extrapolate these results as well.

Table 18 : Dose-response curve for cancer incidence rate in exposed group

| | "Dose" or length of involvement | | |
|---|---------------------------------|---------------------|---------------------|
| | Lowest tertile | Middle tertile | Highest tertile |
| Number of cancers | 8 | 3 | 5 |
| Total Person years | 2779 | 3046 | 2985 |
| Cancer incidence rate (per 1000) | 2.88 (1.24-5.66) | 0.98 (0.20-2.88) | 1.68 (0.54-3.91) |

Not adjusted for age

c) Consider biological plausibility

One way to do this is to look at subtypes of cancer. From the literature review in Phase I, we highlighted *a priori*, the fact that the cancers that had been linked to organic solvents were the following: haematopoietic, lung, buccal cavity, genitourinary and gastrointestinal (including liver and pancreas). Restricting the outcome events to only these subtypes unfortunately decreases power and widens the confidence intervals. Table 19 shows the Relative Risks for any cancer of interest, regardless of whether it was the first, second or third cancer for an individual. The point estimates all remain elevated, but do not increase, and therefore do not add further evidence incriminating DSRS exposures as the responsible factor.

Table 19 : Weighted results for cancers *a-priori* linked to organic solvents

| | IRR (control first posting) | | IRR (control last posting) | |
|--------------------------------|-----------------------------|-----------------------|----------------------------|-----------------------|
| | All cancers | Specific cancers | All cancers | Specific cancers |
| All exposed vs Amberley | 1.51 (0.96 – 2.29) | 1.47 (0.80 – 2.51) | 1.62 (1.03 – 2.47) | 1.68 (0.91 – 2.91) |
| All exposed vs Richmond | 1.45 (0.93 – 2.18) | 1.40 (0.77 – 2.36) | 1.60 (1.02 – 2.41) | 1.47 (0.81 – 2.50) |

5.1.3 Generalisability of the results

The increased cancer incidence reported here appears to be specific to DSRS activities since the Richmond comparison group who were exposed to other aircraft maintenance duties did not show a similar increase, i.e. the IRR between Amberley and Richmond were not increased (data not shown). In addition, we find no evidence that the risk is restricted to those who participated in Program 1; subgroup comparisons of Program 1 and 2 participants yield very similar point estimates, although the confidence intervals are wide. It is important to note that although the participants in this study were restricted to those involved in the formal Deseal/Reseal programs; those who participated in other programs, e.g. Pick and Patch, or other ad hoc repairs, may have had similar exposures, and the results of this study may have some applicability to them.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

6.1.1 Cancer Incidence

The results of this study indicate a higher incidence of cancer in the DSRS group, with an increase of around 40-50% in the incidence of cancer relative to both the Amberley and Richmond comparison groups. The caveats in interpreting these results are that, as in any observational study, we cannot exclude the possibility of selection bias or diagnostic suspicion bias, which would falsely increase the apparent effect of DSRS activities. However, we believe that these biases do not account for the observed increase in cancer and that this increase in cancer is likely to be valid because:

- The point estimates are consistent across all outcomes, control posting dates, and subgroup comparisons;
- Comparison with the Australian population indicates an almost identical point estimate;
- Survival analysis also yields similar results;
- The degree of selection bias required to create such a shift away from the null would have to be unusually large; and
- Correction for survivor bias drives the results further away from the null, i.e. increases the estimate of cancer risk associated with DSRS.

However, as yet there is no corroborative evidence from within the exposed group of a DSRS effect, in that a dose-response relationship has not yet emerged, nor was there a greater risk elevation in cancers suspected “*a priori*” to be at a greater potential risk from DSRS exposures. Also, as yet, there is no evidence of a latency effect.

The absence of this type of corroborative evidence does not negate the evidence for an increased risk in the exposed group. Rather it does not contribute further evidence pointing to DSRS exposures as the responsible factor. With relatively few cancers so far available for study, this limits the power of the analyses and it is clear that further follow-up investigation would be required for effective evaluation of dose response and other trends within the exposed group.

6.1.2 Mortality

Mortality for the exposed group was significantly lower than for both comparison groups, likely due to survivor bias in the exposed group.

6.2 Recommendations

We conclude, on the balance of probabilities, that there is an increased risk of cancer associated with participation in the F-111 DSRS group. We feel that although not all the results formally reach statistical significance, it would be unwise to ignore them. A variety of sensitivity analyses indicate that the two major biases, survivor bias and selection bias, are acting in opposite directions, leading to a point estimate which is valid. We consider that it may be wise to:

1. Repeat these analyses in the future (in three to five years for example) when more outcome events are available; this should increase the power of the study. These future analyses should also focus on specific cancers linked to organic solvents and hexavalent chromium exposure. It is important to note however that larger numbers will only increase precision not validity. The various biases described in the previous section will still be present, and the need to exercise judgement about the magnitude of these competing biases cannot be avoided.
2. Check for evidence of any confounding by looking at the distribution of other occupational exposures. Such work will be undertaken and the results will be discussed in the Report on the General Health and Medical Study (Phase III).

3. Explore the potential for, and magnitude of, selection bias by selecting a subgroup of comparisons matched to cases on “somatic tendency”, as judged by self-reported signs and symptoms, as outlined in Section IIa previously. This information will also be available after completion of the Phase III studies.

It is important to note that the latter two options involve Phase III results, and that participants in that phase are only a subset of those included in this present study; this means that these potential analyses will only be an approximation of the effect seen in this study.

7 REFERENCES

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8 APPENDICES

- Appendix A : Organisations which provided Ethics approval
- Appendix B : Commonwealth Department of Veterans' Affairs advertisement for the General Health and Medical Study
- Appendix C : Exposure Questionnaire mailed to all potentially exposed individuals to assess DSRS exposure
- Appendix D : List of Mustering Categories for the Amberley Comparison Group (Non-Technical Trades)
- Appendix E : List of Mustering Categories for the Richmond Comparison Group (Technical Trades)
- Appendix F : Procedure for Defining the Amberley Comparison Group
- Appendix G : Procedure for Defining the Richmond Comparison Group
- Appendix H : Strata Weights
- Appendix I : Characteristics of individuals selected using latest posting date
- Appendix J : Standardised incidence ratio for cancer compared to the Australian population, 1983-2000
- Appendix K : Standardised mortality ratio compared to the Australian population, 1975-2001

Appendix A : Organisations which provided Ethics approval

| Organisation | Committee |
|--|---|
| The University of Newcastle | The University of Newcastle Human Research Ethics Committee |
| Australian Department of Defence | Australian Defence Human Research Ethics Committee |
| Commonwealth Department of Veterans' Affairs (DVA) | DVA Human Research Ethics Committee |
| Australian Institute of Health and Welfare (AIHW) | AIHW Ethics Committee |
| ACT Department Of Health & Community Care | Human Research Ethics Committee |
| NSW Health Department | Endorsement of the Cancer Council's Ethic Committee's decisions |
| NT Department of Health & Community Services and Menzies School of Health Research | Human Research Ethics Committee |
| Queensland Cancer Registry | Queensland Cancer Registry Advisory Committee |
| SA Department of Human Services: Strategic Planning and Policy Division | Human Research Ethics Sub-Committee |
| Tasmanian Cancer Registry: Menzies Centre for Population Health Research, University of Tasmania | Authority for the release of named data on Tasmanian cancer cases |
| The Cancer Council | Human Research Ethics Committee |
| WA Department of Health | Confidentiality of Health Information Committee (CHIC) |

**Appendix B : Commonwealth Department of Veterans' Affairs
advertisement for the General Health and Medical Study**



Commonwealth Department of
Veterans' Affairs

**F-111 Deseal/Reseal Program - Amberley
Participants sought for
Health Study**

All serving and former RAAF personnel and civilian contractors involved in the desealing and resealing of F-111 fuel tanks at RAAF Amberley are being sought to take part in a health study to be conducted by the Department of Veterans' Affairs (DVA).

The study will complement the work of the RAAF Board of Inquiry, established to investigate and report on the deseal/reseal program. DVA and the Board of Inquiry already have been approached by a number of individuals who were involved in the maintenance program. It is possible, however, that some personnel who were involved have not yet been in contact.

So that the health concerns of all those affected can be addressed, it is important that everyone who has been involved in the deseal/reseal program be given the opportunity to be included in the study.

DVA will contract a suitably qualified scientific organisation to undertake the study. It will involve a thorough medical examination including blood testing, psychometric testing and the completion of questionnaires which will, in part, seek information about the health of spouses, partners and children. Participation in the health study will be on a voluntary basis and the maintenance of privacy will be paramount. An independent Scientific Advisory Committee will oversee the project.

Personnel wishing to participate in the study, who have not yet contacted the Board of Inquiry or DVA, should contact Lesley Meredith of DVA (Brisbane) during business hours on telephone (07) 3223 8757 or email lesley.meredith@dva.gov.au by Friday 31 August 2001.

Those personnel who have changed their address since making contact are also urged to contact DVA with their new details.

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Appendix C : Exposure Questionnaire mailed to all potentially exposed individuals to assess DSRS exposure

If you were actively involved in any of the F-111 DSRS programs, please indicate below the types of duties that you carried out (please tick all items that apply) and the years and length of time you performed these duties. An example is shown below.

-- This is an Example Page Only --

| | | | | |
|--|---|---|--|---|
| Did you do activities related to the Deseal/ Reseal Program #1 - at RAAF Amberley in the late 1970's and early 1980's? | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | |
| <i>If YES – did you actively take part in ...</i> | | | | |
| | | | Average time for each activity (per week) | Approximate total period of time involved |
| X.1 | De-puddling of fuel tanks | <input checked="" type="checkbox"/> Yes → <input type="checkbox"/> No <input type="checkbox"/> Don't Know | <input type="checkbox"/> less than 1 day <input checked="" type="checkbox"/> 1 day <input checked="" type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input checked="" type="checkbox"/> 1 month to less than 6 months <input checked="" type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| X.2 | Scrubbing / smoothing of tank surface by hand | <input type="checkbox"/> Yes → <input type="checkbox"/> No <input checked="" type="checkbox"/> Don't Know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| X.3 | Disposal of Waste SR51 and Waste Solutions | <input type="checkbox"/> Yes → <input checked="" type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

PART A

| Did you do activities related to the Deseal/ Reseal Program #1 - at RAAF Amberley in the late 1970's and early 1980's? | | <input type="checkbox"/> Yes | <input type="checkbox"/> No (Go to PART B) |
|--|---|--|---|
| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | |
| | | <i>Approximate total period of time involved</i> | |
| A.1 | De-fuelling of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| A.2 | De-puddling of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| A.3 | De-plumbing of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| A.4 | Chemical de-sealing of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|---|--|--|---|
| A.5 | Removing sealant by the use of high pressure water pick | <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| A.6 | Scrubbing / smoothing of tank surface by hand | <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| A.7 | Application of epoxy barrier (XA3598) | <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| A.8 | Application of new fillet sealant | <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| A.9 | Re-plumbing of fuels tanks | <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|--|--|---|
| A.10 | Leak testing <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| A.11 | Final tank integrity inspection <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| A.12 | Disposal of waste SR51 and waste solutions <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

PART B

| Did you do activities related to the Deseal/ Reseal Program #2 - at RAAF Amberley in the late 1980's and early 1990's? | | <input type="checkbox"/> Yes | <input type="checkbox"/> No (Go to PART C) |
|--|---|--|---|
| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
| B.1 | De-fuelling of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| B.2 | De-puddling of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| B.3 | De-plumbing of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| B.4 | Removing sealant by the use of high pressure water pick <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|--|--|---|
| B.5 | Scrubbing / smoothing of tank surface by hand <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| B.6 | Fuel tank inspection (black light inspection and resealing of voids) <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| B.7 | Application of epoxy barrier (XA3598) <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| B.8 | Application of new fillet sealant <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| B.9 | Re-plumbing of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|---|--|---|
| B.10 | Leak testing <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| B.11 | Final tank integrity inspection <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

PART C

| Did you do activities related to the Wing Tank Deseal/ Reseal Program - at RAAF Amberley from mid 1980s to early 1990s? | | <input type="checkbox"/> Yes | <input type="checkbox"/> No (Go to PART D) |
|--|---|--|---|
| <i>If YES – did you actively take part in ...</i> | | <i>Approximate total period of time involved</i> | |
| | | <i>Average time for each activity (per week)</i> | |
| C.1 | De-fuelling of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|---|--|--|---|
| C.2 | De-puddling of fuel tanks | <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| C.3 | De-plumbing of fuel tanks | <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| C.4 | Removing sealant by the use of high pressure water pick | <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| C.5 | Removing sealant with walnut shell blaster | <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| C.6 | Scrubbing / smoothing of tank surface by hand | <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|---|--|---|
| C.7 | Application of epoxy barrier (XA3598) <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| C.8 | Application of new fillet sealant <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| C.9 | Refitting wing planks <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| C.10 | Leak testing and/or inspection <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| C.11 | Re- plumbing of fuel tanks <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|---|--|---|
| C.12 | Leak testing <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| C.13 | Final tank integrity inspection <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

PART D

| Did you do activities related to the Spray Seal Program - Post 1996 at RAAF Amberley? | | <input type="checkbox"/> Yes | <input type="checkbox"/> No (Go to PART E) |
|--|---|--|---|
| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | |
| <i>Approximate total period of time involved</i> | | | |
| D.1 | De-fuelling of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|---|--|---|
| D.2 | De-puddling of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| D.3 | De-plumbing of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| D.4 | Removing sealant by the use of high pressure water pick <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| D.5 | Applying high pressure detergent wash to tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| D.6 | Applying hot rinse to tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|--|--|---|
| D.7 | Scrubbing / smoothing of tank surface by hand <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| D.8 | Application of epoxy barrier <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| D.9 | Application of primer with manoeuvrable pressure pot <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| D.10 | Application of new sealant with air-assisted gun <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| D.11 | Re- plumbing of fuel tanks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|---|--|---|
| D.12 | Leak testing <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| D.13 | Final tank integrity inspection <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

PART E

| Did you do activities related to the Storage of Deseal/Reseal materials? | | <input type="checkbox"/> Yes | <input type="checkbox"/> No (Go to PART F) |
|---|---|--|---|
| <i>If YES – did you actively take part in ...</i> | | <i>Approximate total period of time involved</i> | |
| | | <i>Average time for each activity (per week)</i> | |
| E.1 | Storage of chemicals <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| E.2 | Cleaning of chemical storage facilities <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|---|--|---|
| E.3 | Decanting or recanting of chemicals <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| E.4 | Destruction of chemicals <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| E.5 | Disposal of chemicals <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

PART F

| Did you do activities related to the Disposal of Deseal/Reseal materials? | | <input type="checkbox"/> Yes | <input type="checkbox"/> No (Go to PART G) |
|--|--|--|---|
| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
| F.1 | Disposal of waste SR51 or rinse solution <input type="checkbox"/> Yes – Please specify <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|---|--|---|
| F.2 | Burning of waste SR51 or rinse solution <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| F.3 | Pouring of solutions into drains <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| F.4 | Transportation of sludge to remote areas for air drying <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| F.5 | Collection of air dried powder <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| F.6 | Burning of air dried powder <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|--|--|---|
| F.7 | Absorbing SR51 by Tec Blocks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| F.8 | Disposal of SR51 soaked Tec Blocks <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

PART G

| Did you do activities related to the Mixing of Deseal/Reseal materials? | | <input type="checkbox"/> Yes | <input type="checkbox"/> No (Go to PART H) |
|--|--|--|---|
| <i>If YES – did you actively take part in ...</i> | | <i>Approximate total period of time involved</i> | |
| | | <i>Average time for each activity (per week)</i> | |
| G.1 | Mixing of sealant <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| G.2 | Cleaning mixing machines with detergent products <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

| <i>If YES – did you actively take part in ...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
|---|---|--|---|
| G.3 | Cleaning mixing machines with MEK <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| G.4 | Storage of chemicals <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| G.5 | Transportation of sludge to remote areas for air drying <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

PART H

| Did you do other duties that may have been associated with the Deseal/Reseal Programs, or conducted alongside the Deseal/Reseal work? | | <input type="checkbox"/> Yes | <input type="checkbox"/> No (Go to PART I) |
|---|---|--|---|
| <i>If YES – please list the other duties below...</i> | | <i>Average time for each activity (per week)</i> | <i>Approximate total period of time involved</i> |
| H.1 | Duties <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| H.2 | Duties <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| H.3 | Duties <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |
| H.4 | Duties <input type="checkbox"/> Yes – Please specify → <input type="checkbox"/> No <input type="checkbox"/> Don't know | <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days <input type="checkbox"/> 4 days <input type="checkbox"/> 5 days or more | <input type="checkbox"/> less than 1 month <input type="checkbox"/> 1 month to less than 6 months <input type="checkbox"/> 6 months to less than 12 months <input type="checkbox"/> 12 months to less than 24 months <input type="checkbox"/> more than 24 months |

Appendix C continued...

PART I

Are there any other types of work activities that we have missed?

Are there F-111 Deseal/Reseal tasks that are not included here that you think should be? If "YES" – please specify below –

.....
.....
.....

Are there any work duties that may have been carried out in the close vicinity of the Deseal/Reseal Programs that you think should also be included here? If "YES" – please specify below. You may also attach additional pages of comments if required.

.....
.....
.....
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.....
.....

**Please return this Exposure Questionnaire in the reply-paid envelope provided with your invitation package.
If you do not intend taking part in a health examination, please use the reply-paid envelope to return this Questionnaire and your Postal Questionnaire booklet. Thank you.**

**Appendix D : List of Mustering Categories for the Amberley
Comparison Group (Non-Technical Trades)**

| Code | name |
|-------------|--------------------------------------|
| C031 | Supply |
| C031 | Supply |
| C031 | Supply |
| C031 | Logistics Officer |
| C032 | WKS |
| C033 | EQUIPUNCAT |
| C033 | Supply Non-Specialist |
| C034 | Logistics Officer |
| C035 | Legal Officer 1 |
| C036 | Legal Officer 2 |
| C037 | Legal Officer 3 |
| C038 | Legal Officer 4 |
| C039 | Legal Officer 5 |
| C041 | Medical |
| C042 | Dental |
| C043 | Pharmacy |
| C044 | Environmental Health |
| C044 | Environmental Health |
| C045 | Laboratory |
| C046 | Radiography |
| C047 | Medical Non-Specialist |
| C048 | Medical Non-Specialist |
| C049 | Nurse |
| C050 | AHP |
| C051 | Accounting |
| C052 | Medical Non-Specialist |
| C053 | MEDICAL NON SPECIALIST CIVILIAN GRAD |
| C061 | Administration |

Appendix D continued...

| Code | name |
|-------------|----------------------|
| C062 | Air Traffic Control |
| C062 | Air Traffic Control |
| C063 | Ground Defence |
| C063 | Ground Defence |
| C064 | Air Defence |
| C064 | Air Defence |
| C065 | Photography |
| C065 | Photography |
| C065 | Photography |
| C066 | Police |
| C066 | Police |
| C066 | Police |
| C067 | Education |
| C067 | Education |
| C068 | Legal |
| C068 | Legal |
| C069 | WRAAF |
| C070 | PRO |
| C070 | PR |
| C071 | Meteorology |
| C071 | Meteorology |
| C072 | WRAAFM |
| C073 | Intelligence |
| C073 | Intelligence |
| C074 | Operations |
| C074 | Operations |
| C075 | Other Non-Specialist |
| C075 | Other Non-Specialist |
| C075 | Other Non-Specialist |

Appendix D continued...

| Code | name |
|-------------|---|
| C076 | Facilities |
| C076 | Facilities |
| C076 | Facilities |
| C077 | Other Non-Specialist |
| C077 | Other Non-Specialist |
| C078 | Other Non-Specialist |
| C078 | Other Non-Specialist |
| C079 | Journalist |
| C080 | SECURITY POLICE OFFICER |
| C081 | Chaplain |
| C082 | General List |
| C085 | GLEX |
| C086 | GLEXO |
| C087 | RACT |
| C092 | Legal – Uncategorised |
| M000 | NO ENTRY |
| M003 | SIG |
| M020 | CLERK GRADE 1/TRAINEE |
| M021 | CLERK GRADE 1 |
| M022 | CLERK GRADE 2 |
| M024 | CLERK GRADE 1/PROVISIONAL |
| M026 | DENTMECH |
| M027 | DRAFTSMAN architect |
| M030 | DRAFTSMAN ENGINEER |
| M033 | DMANSURV |
| M035 | COMMS & INFO SYSTEMS CONTROLLER/TRAINEE |
| M036 | COMMS & INFO SYSTEMS CONTROLLER |
| M038 | LINGUIST6 |
| M040 | PRLINOP |

Appendix D continued...

| Code | name |
|-------------|--|
| M041 | PRLCAMOP |
| M042 | PRMONOP |
| M043 | PRPRFRDR |
| M054 | WKSSUP |
| M055 | IMAGERY ANALYST/TRAINEE |
| M056 | IMAGERY ANALYST |
| M057 | ELECTRONIC DATA PROCESSING OPERATOR |
| M061 | BBDR(W) |
| M068 | ATCNCO |
| M068 | ATC |
| M080 | CINOP6 |
| M092 | HYGINSP |
| M092 | ENVIRONMENTAL HEALTH SURVEYOR |
| M094 | DENTAL SUPERVISOR GRADE 1 |
| M095 | DENTAL SUPERVISOR GRADE 2 |
| M099 | MNAV |
| M109 | MBBM |
| M110 | MBBW |
| M111 | PSASSES6 |
| M112 | PHOTOGRAPHER |
| M118 | PUBLIC RELATIONS ADMINISTRATION |
| M121 | PRBBIND |
| M124 | PRCOMP |
| M131 | COMPOP |
| M138 | COMMS & INFO SYSTEMS CONTROLLER GRADE 1 |
| M139 | COMMS & INFO SYSTEMS CONTROLLER GRADE 2 |
| M140 | WOSIGS |
| M142 | DET SPVR COMMS & INFO SYSTEMS CONTROLLER |
| M143 | SPVR COMMS & INFO SYSTEMS CONTROLLER |

Appendix D continued...

| Code | name |
|-------------|---|
| M145 | MANAGER COMMS & INFO SYSTEMS CONTROLLER |
| M148 | RADIOG6 |
| M149 | CLERK SUPPLY |
| M152 | SCLKSPLY |
| M155 | SUPPLIER |
| M156 | SUPPLIER GRADE 1 |
| M157 | SUPPLIER GRADE 2 |
| M158 | SPLYSUP1 |
| M158 | SPLYSPVR |
| M159 | SPLYSUP2 |
| M159 | SPLYSPVR |
| M160 | SPLYSUP3 |
| M160 | SPLYSPVR |
| M163 | MESSPVR |
| M166 | CHEF |
| M169 | ASSTSPLR |
| M171 | BUTCHER |
| M174 | CLERK EQUIPMENT ACCOUNTS |
| M177 | CLERK FINANCIAL ACCOUNTS |
| M180 | CLKG |
| M180 | STENOGRAPHER |
| M183 | EDUCATION ASSISTANT |
| M189 | MNADMIN |
| M196 | TAILOR |
| M199 | TELSOPC |
| M200 | TPRINOPC |
| M201 | METASST |
| M202 | MEDICAL SUPERVISOR GRADE 1 |
| M204 | AIRFIELD DEFENCE GUARD GRES GRADE 1 |

Appendix D continued...

| Code | name |
|-------------|-----------------------------------|
| M205 | ADGGR2 |
| M205 | AIRFIELD DEFENCE GUARD GRADE 2 |
| M205 | AIRFIELD DEFENCE GUARD GRADE 1 |
| M206 | ADGGR3 |
| M206 | AIRFIELD DEFENCE GUARD GRADE 3 |
| M206 | AIRFIELD DEFENCE GUARD GRADE 2 |
| M207 | Airfield Defence Guard Grade 3 |
| M208 | ADOP |
| M209 | ADPLOT |
| M210 | ADSUP |
| M210 | ADSPVR |
| M210 | ASSPVR |
| M211 | Supervisor Airfield Defence Guard |
| M212 | Manager Airfield Defence Guard |
| M213 | ACCTMOP |
| M216 | ACPLOT |
| M223 | CATERER |
| M226 | CLERK ADMINISTRATION |
| M229 | CLKE |
| M230 | CLERK MEDICAL |
| M238 | FIREMAN |
| M238 | FIREFIGHTER |
| M240 | INST REP |
| M244 | MTD |
| M250 | PHYSICAL TRAINING INSTRUCTOR |
| M256 | SP |
| M261 | ADI |
| M263 | PLANT INSPECTOR |
| M265 | COOK |

Appendix D continued...

| Code | name |
|-------------|------------------------------|
| M266 | COX1 |
| M267 | COXWAIN GRADE 2 |
| M270 | DI |
| M271 | EQASST |
| M277 | MARINE CRASH CREWMAN |
| M280 | MEDORD |
| M283 | SGUARD |
| M283 | POLICE DOG HANDLER |
| M286 | AIR PHOTO PLOTTER |
| M289 | WARRANT OFFICER DISCIPLINARY |
| M291 | WRADNCO |
| M292 | COMMUNICATIONS OPERATOR |
| M295 | BBDR |
| M296 | SWNCO |
| M302 | PUBLICATIONS ASSISTANT |
| M305 | MEDICAL ASSISTANT GRADE 2 |
| M306 | MEDICAL ASSISTANT GRADE 3 |
| M308 | CLERK |
| M311 | DENTAL ASSISTANT |
| M314 | WTD |
| M317 | TELSOP |
| M320 | TELEPHONE OPERATOR |
| M323 | TPRINOP |
| M324 | VCANIZER |
| M325 | DENTSPVR |
| M328 | MEDICAL ASSISTANT GRADE 1 |
| M330 | MEDICAL SUPERVISOR GRADE 2 |
| M331 | COOKS ASSISTANT |
| M334 | GENERAL HAND |
| M337 | GUARD |

Appendix D continued...

| Code | name |
|-------------|-----------------------------------|
| M338 | STEWARD GRADE 1 |
| M341 | STEWARD GRADE 2 |
| M339 | Mess Operator Grade 1 |
| M340 | Mess Operator Grade 2 |
| M342 | MESS OPERATOR |
| M344 | TRAINEE |
| M356 | COOK GRADE 1 |
| M359 | COOK GRADE 2 |
| M362 | MOTOR TRANSPORT DRIVER GRADE 1 |
| M365 | MOTOR TRANSPORT DRIVER GRADE 2 |
| M368 | DENTAL HYGIENIST |
| M371 | PHOTOGRAPHIC INTERPRETER |
| M374 | SIGNALS OPERATOR |
| M377 | PRSUP |
| M378 | LMUSIC |
| M378 | MUSICIAN GRADE 3 |
| M381 | MUSICIAN |
| M381 | MUSICIAN GRADE 2 |
| M384 | CINEMA OPERATOR |
| M390 | LINGUIST |
| M393 | PSYCHOLOGY ASSESSOR |
| M396 | RADIOG |
| M433 | ADOP1 |
| M433 | AIR SURVEILLANCE OPERATOR GRADE 1 |
| M434 | ADOP2 |
| M434 | AIR SURVEILLANCE OPERATOR GRADE 2 |
| M437 | ROYAL AUSTRALIAN AIR FORCE POLICE |
| M440 | RAAF POLICE INSPECTOR |
| M443 | PRBBIND1 |
| M444 | PRBBIND2 |

Appendix D continued...

| Code | name |
|-------------|--|
| M454 | CESYSTECH1 |
| M455 | CESYSTECH |
| M455 | CESYSTECH2 |
| M460 | RAAF POLICE GRADE 1/TRAINEE |
| M461 | RAAF POLICE GRADE 1 |
| M462 | RAAF POLICE GRADE 2 |
| M463 | SECURITY POLICE GRADE 1 |
| M464 | SECURITY POLICE GRADE 2 |
| M465 | SECURITY POLICE/TRAINEE |
| M466 | PHOTOGRAPHER GRADE 1 |
| M467 | PHOTOGRAPHER GRADE 2 |
| M468 | PHOTO UNIT SUPERVISOR |
| M469 | IMAGERY PRODUCTION MANAGER |
| M470 | FLIGHT TEST PHOTOGRAPHER |
| M471 | UNIT FLIGHT TEST SPECIALIST |
| M472 | PHOTO UNIT SPVR FLIGHT TEST PHOTOGRAPHER |
| M473 | IMAGERY PRODUCTION MNGR FLT TEST PHOTO |
| M474 | SIGNALS OPERATOR LINGUIST GRADE 1 |
| M475 | SIGNALS OPERATOR TECHNICAL GRADE 1 |
| M476 | SIGNALS OPERATOR LINGUIST GRADE 2 |
| M477 | SIGNALS OPERATOR TECHNICAL GRADE 2 |
| M478 | SIGNALS OPERATOR LINGUIST ANALYST |
| M479 | SIGNALS OPERATOR GENERAL LINGUIST |
| M480 | SIGNALS OPERATOR TECHNICAL ANALYST |
| M481 | SIGNALS OPERATOR LINGUIST ADV ANALYST |
| M482 | SIGNALS OPERATOR ADVANCED LINGUIST |
| M483 | SIGNALS OPERATOR TECHNICAL ADV ANALYST |
| M484 | SENIOR MANAGER PROCESSING |
| M485 | SENIOR MANAGER TECHNICAL |
| M700 | DIPCDT1 |

Appendix D continued...

| Code | name |
|-------------|--|
| M706 | CADET |
| M712 | SIGTR |
| M713 | DIPCDT2 |
| M719 | ACCTMOP-trainee |
| M722 | ACPLOT-trainee |
| M725 | AIRFIELD DEFENCE GUARD GRADE 1/TRAINEE |
| M728 | AIR PHOTO PLOTTER/TRAINEE |
| M743 | CLERK/TRAINEE |
| M746 | CLKE-trainee |
| M747 | CLERK EQUIPMENT ACCOUNTS/TRAINEE |
| M750 | CLKM-trainee |
| M753 | COOK-trainee |
| M756 | DENTAL ASSISTANT/TRAINEE |
| M759 | DI-trainee |
| M762 | EQASST-trainee |
| M763 | FABWKR-trainee |
| M766 | FIREMAN/TRAINEE |
| M766 | FIREFIGHTER/TRAINEE |
| M769 | MEDICAL ASSISTANT GRADE 1/TRAINEE |
| M769 | MEDICAL ASSISTANT/TRAINEE |
| M772 | PHOTOGRAPHER/TRAINEE |
| M775 | PSASSES-trainee |
| M778 | PHYSICAL TRAINING INSTRUCTOR/TRAINEE |
| M781 | SGUARD-trainee |
| M781 | POLICE DOG HANDLER/TRAINEE |
| M784 | SP-trainee |
| M787 | STEWARD/TRAINEE |
| M793 | TELSOP-trainee |
| M794 | TELEPHONE OPERATOR/TRAINEE |
| M797 | TPRINOP-trainee |

Appendix D continued...

| Code | name |
|-------------|---------------------------------------|
| M800 | WRADNCO-trainee |
| M803 | EDPOP-trainee |
| M806 | APHPLOT-trainee |
| M809 | UNICDT |
| M818 | EDASST-trainee |
| M821 | CLKFA-trainee |
| M824 | CLERK ADMINISTRATION/TRAINEE |
| M830 | AIRFIELD DEFENCE GUARD/TRAINEE |
| M833 | BBDR(W)-trainee |
| M834 | CLERK SUPPLY/TRAINEE |
| M837 | DENTAL HYGIENIST/TRAINEE |
| M840 | DMANENG-trainee |
| M849 | HYGINSP-trainee |
| M849 | ENVIRONMENTAL HEALTH SURVEYOR/TRAINEE |
| M858 | SUPPLIER/TRAINEE |
| M865 | LINGUIST-trainee |
| M868 | AIR DEFENCE PLOTTER/TRAINEE |
| M875 | MCCREW-trainee |
| M884 | COMMSOP-trainee |
| M887 | BBDR-trainee |
| M888 | SWNCO-trainee |
| M891 | PUBASST-trainee |
| M892 | SIGNALS OPERATOR/TRAINEE |
| M895 | TAILOR/TRAINEE |
| M898 | ADOP1-trainee |
| M898 | AIR SURVEILLANCE OPERATOR/TRAINEE |
| M901 | COOK/TRAINEE |
| M904 | RAAF POLICE/TRAINEE |
| M909 | EQUIPUNCAT |
| M910 | Engineer Non-Specialist |

Appendix D continued...

| Code | name |
|-------------|----------------------|
| M912 | Other Non-Specialist |
| M915 | WORKS SUPERVISOR |

**Appendix E : List of Mustering Categories for the Richmond
Comparison Group (Technical Trades)**

| Code | name |
|-------------|---|
| C021 | ENGRARM |
| C021 | Armament Engineer |
| C022 | ENGRAERO |
| C022 | Aeronautical Engineer |
| C023 | ENGRELEC |
| C023 | ELEC |
| C024 | ENGRINST |
| C024 | INST |
| C025 | ENGRMAR |
| C025 | MAR |
| C026 | ENGRMECH |
| C026 | MECH |
| C027 | ENRRAD |
| C027 | RAD |
| C028 | ENGRTECH |
| C029 | Engineer Non-Specialist |
| C030 | Electronics Engineer |
| C076 | Airfield Engineer |
| M001 | TRADE APPRENTICE AVIONICS |
| M001 | TRADE APPRENTICE AVIONICS |
| M002 | TRADE APPRENTICE AIRCRAFT |
| M002 | TRADE APPRENTICE AIRCRAFT |
| M005 | ASTFITT1 |
| M006 | ASTFITT2 |
| M007 | ADVANCED AIRCRAFT STRUCTURAL FITTER |
| M008 | ADVANCED AIRCRAFT STRUCTURAL TECHNICIAN |
| M009 | GROUND SPT ENGINEERING FITTER GRADE 1 |
| M010 | GROUND SPT ENGINEERING FITTER GRADE 2 |

Appendix E continued...

| Code | name |
|-------------|---------------------------------------|
| M011 | GROUND SUPPORT ENGINEERING TECHNICIAN |
| M012 | ADVANCED GROUND SPT ENGINEERING TECH |
| M013 | COMMUNICATIONS ELECTRONICS MECHANIC |
| M014 | COMMS ELECTRONICS FITTER GRADE 1 |
| M015 | COMMS ELECTRONICS FITTER GRADE 2 |
| M016 | COMMUNICATIONS ELECTRONICS TECHNICIAN |
| M017 | ADVANCED COMMS ELECTRONICS TECHNICIAN |
| M018 | COMMS ELECTRONICS SYSTEMS TECHNICIAN |
| M019 | COMMS ELECTRONICS FITTER/TRAINEE |
| M023 | GROUND SPT ENGINEERING FITTER/TRAINEE |
| M037 | INSTRUMENT FITTER |
| M039 | PLANTOP |
| M045 | RADIO TECHNICIAN AIR |
| M048 | RADIO TECHNICIAN GROUND |
| M051 | WELDER AIRCRAFT |
| M052 | WELDER AIRCRAFT GRADE 1 |
| M053 | WELDER AIRCRAFT GRADE 2 |
| M058 | TELECOMMUNICATIONS TECHNICIAN |
| M064 | MTFITTGR1 |
| M064 | MOTOR TRANSPORT FITTER GRADE 1 |
| M065 | MTFITTGR2 |
| M065 | MOTOR TRANSPORT FITTER GRADE 2 |
| M069 | AIRCRAFT METAL WORKER GRADE 1 |
| M069 | AIRCRAFT STRUCTURAL FITTER GRADE 1 |
| M070 | AIRCRAFT METAL WORKER GRADE 2 |
| M070 | AIRCRAFT STRUCTURAL FITTER GRADE 2 |
| M071 | AIRCRAFT METAL WORKER |
| M073 | AFCARP |
| M074 | AFFITT |
| M075 | ARMFITT |

Appendix E continued...

| Code | name |
|-------------|--------------------------------------|
| M076 | BARRACKS ELECTRICIAN |
| M076 | ELECTRICIAN |
| M079 | BLACKSMITH |
| M081 | ELECTRICAL FITTER |
| M082 | ELECTROPLATER |
| M085 | ENGINE FITTER |
| M086 | GENCARP |
| M086 | CARPENTER |
| M089 | GENERAL FITTER |
| M096 | MCFITT |
| M102 | MTFITT |
| M103 | METAL MACHINIST |
| M104 | METAL MACHINIST GRADE 1 |
| M105 | METAL MACHINIST GRADE 2 |
| M106 | MOTOR BODY BUILDER |
| M115 | PLUMBER |
| M125 | PRLMACH |
| M126 | PRPLMKR |
| M127 | PROMACH |
| M128 | SWRIGHT |
| M134 | TELEG |
| M137 | WARRANT OFFICER ENGINEER |
| M141 | WELDER GENERAL |
| M144 | WOOD MACHINIST |
| M147 | WKSFITT |
| M186 | MOTOR TRANSPORT TRIMMER |
| M190 | SAFETY EQUIPMENT WORKER |
| M190 | AIRCRAFT LIFE SUPPORT FITTER |
| M191 | AIRCRAFT LIFE SUPPORT FITTER GRADE 1 |
| M192 | AIRCRAFT LIFE SUPPORT FITTER GRADE 2 |

Appendix E continued...

| Code | name |
|-------------|---------------------------|
| M193 | SURFACE FINISHER |
| M194 | AIRCRAFT SURFACE FINISHER |
| M217 | AIR FRAME MECHANIC |
| M220 | ARMEMENT MECHANIC |
| M231 | ELECSMAN |
| M234 | ENGINE MECHANIC |
| M237 | FABRICATION WORKER |
| M241 | INSTRUMENT MECHANIC |
| M247 | MOTOR TRANSPORT MECHANIC |
| M253 | RADIO MECHANIC |
| M257 | WKSFITTGR1 |
| M258 | WKSFITTGR2 |
| M262 | BOILATT |
| M262 | PLANT ATTENDANT |
| M274 | LINESMAN |
| M274 | TELECOMMUNICATIONS RIGGER |
| M299 | DENTAL TECHNICIAN |
| M387 | LABTECH |
| M397 | AIR FRAME FITTER GRADE 1 |
| M398 | AIR FRAME FITTER GRADE 2 |
| M401 | ARMAMENT FITTER GRADE 1 |
| M402 | ARMAMENT FITTER GRADE 2 |
| M405 | ELECTRICAL FITTER GRADE 1 |
| M406 | ELECTRICAL FITTER GRADE 2 |
| M409 | ENGINE FITTER GRADE 1 |
| M410 | ENGINE FITTER GRADE 2 |
| M413 | INSTRUMENT FITTER GRADE 1 |
| M414 | INSTRUMENT FITTER GRADE 2 |
| M415 | INSTFITT3 |
| M417 | LABTECH1 |

Appendix E continued...

| Code | name |
|-------------|---------------------------------------|
| M418 | LABORATORY TECHNICIAN GRADE 2 |
| M418 | LABORATORY TECHNICIAN |
| M421 | RADIO TECHNICIAN AIR GRADE 1 |
| M422 | RADIO TECHNICIAN AIR GRADE 2 |
| M423 | RADTECHA3 |
| M425 | RADIO TECHNICIAN GROUND GRADE 1 |
| M426 | RADIO TECHNICIAN GROUND GRADE 2 |
| M427 | RADIO TECHNICIAN GROUND GRADE 3 |
| M429 | TELECOMMUNICATIONS TECHNICIAN GRADE 1 |
| M430 | TELECOMMUNICATIONS TECHNICIAN GRADE 2 |
| M431 | TELECOMMUNICATIONS TECHNICIAN GRADE 3 |
| M446 | ASYSTECH1 M447 ASYTECH |
| M447 | ASYSTECH2 |
| M448 | AIRCRAFT SYSTEMS TECHNICIAN |
| M450 | AVSYSTECH1 |
| M451 | AVSYSTECH |
| M451 | AVSYSTECH2 |
| M452 | AVIONICS SYSTEMS TECHNICIAN |
| M703 | TRADE APPRENTICE |
| M703 | TRADE APPRENTICE ENGINEERING |
| M704 | TRADAPPRAD |
| M716 | TECHNICAL APPRENTICE |
| M716 | TECHNICAL APPRENTICE ENGINEERING |
| M717 | TECHAPPRAD |
| M731 | BOILATT-trainee |
| M731 | PLANT ATTENDANT/TRAINEE |
| M734 | CATEGORY 1A/TRAINEE |
| M734 | CATEGORY 1/TRAINEE |
| M737 | CAT2A-trainee |
| M740 | CATEGORY 2B/TRAINEE |

Appendix E continued...

| Code | name |
|-------------|--------------------------------------|
| M740 | CATEGORY 2/TRAINEE |
| M790 | TELEG-trainee |
| M812 | LABORATORY TECHNICIAN/TRAINEE |
| M815 | MBB-trainee |
| M827 | AIRCRAFT METAL WORKER/TRAINEE |
| M827 | AIRCRAFT STRUCTURAL FITTER/TRAINEE |
| M835 | AIRCRAFT MECHANIC/TRAINEE |
| M836 | AIRCRAFT FITTER/TRAINEE |
| M838 | AVIONICS MECHANIC/TRAINEE |
| M839 | AVIONICS FITTER/TRAINEE |
| M841 | MTFITT-trainee |
| M842 | RADIO TECHNICIAN GROUND/TRAINEE |
| M843 | ELECTROPLATER/TRAINEE |
| M846 | GENFITT-trainee |
| M852 | LINESMAN/TRAINEE |
| M852 | TELECOMMUNICATIONS RIGGER/TRAINEE |
| M855 | METAL MACHINIST/TRAINEE |
| M861 | SURFACE FINISHER/TRAINEE |
| M864 | WKSFITT-trainee |
| M871 | WOODMACH-trainee |
| M874 | PLANTOP-trainee |
| M878 | MCFITT-trainee |
| M881 | SAFETY EQUIPMENT WORKER/TRAINEE |
| M881 | AIRCRAFT LIFE SUPPORT FITTER/TRAINEE |
| M906 | MECH-trainee |
| M920 | AIRCRAFT MECHANIC |
| M921 | AIRCRAFT FITTER GRADE 1 |
| M922 | AIRCRAFT FITTER GRADE 2 |
| M923 | AIRCRAFT TECHNICIAN GRADE 1 |
| M924 | AIRCRAFT TECHNICIAN GRADE 2 |

Appendix E continued...

| Code | name |
|-------------|------------------------------|
| M925 | ADVANCED AIRCRAFT TECHNICIAN |
| M930 | AVIONICS MECHANIC |
| M931 | AVIONICS FITTER GRADE 1 |
| M932 | AVIONICS FITTER GRADE 2 |
| M933 | AVIONICS TECHNICIAN GRADE 1 |
| M934 | AVIONICS TECHNICIAN GRADE 2 |
| M935 | ADVANCED AVIONICS TECHNICIAN |

Appendix F : Procedure for Defining the Amberley Comparison Group

Some 24,064 individual personnel are listed on the Air Force Personnel Executive Management System (AFPEMS) database as having been posted or attached for duty at RAAF Amberley between 1975 and 1999. Most of these were RAAF personnel but it also included some overseas military personnel on exchange as well as some Navy and Army personnel. Some 103221 postings and attachments were recorded for these personnel. The posting records for the following groups were excluded to obtain a group for random selection of an appropriate comparison group:

- Confirmed Deseal Reseal participants. The 714 Deseal Reseal group was obtained from the DVA F-111 Chemical Exposure Microsoft Access database from the Query titled “ConfirmedAmbDesRes”.
- Overseas personnel. These were identified by unique identifying numbers >800000.
- Navy and Army personnel. These were identified by rank_code >59 on the database.
- Technical categories and musterings. These were identified as “List =T” as previously assigned in the cat_must_new table.
- Aircrew categories and musterings. These were identified as “List = A” as previously assigned in the cat_must_new table.
- Personnel leaving the RAAF at Amberley. These were identified as ‘Resignation’, ‘Discharge’ or ‘Transfer to the Reserve’ in the ‘Duty’ field in the posting table shown on the following page.

Amberley Postings Table

| Item | Number | Records for Selection of Comparison Group |
|--|--------|---|
| Total Posting/Attachments Records | | 103221 |
| Less Deseal Reseal group (714) | 3784 | 99437 |
| Less Overseas personnel | 297 | 99140 |
| Less Navy and Army personnel | 15 | 99125 |
| Less Technical occupations | 39085 | 60040 |
| Less Aircrew occupations | 7521 | 52529 |
| Less resignations, discharges and transfers to the Reserve | 3885 | 48644 |

Prepared by Dr Warren Harrex, DVA

Appendix G : Procedure for Defining the Richmond Comparison Group

Some 26,063 individual personnel are listed on the Air Force Personnel Executive Management System (AFPEMS) database as having been posted or attached for duty at RAAF Richmond between 1975 and 1999. Most of these were RAAF personnel but it also included some overseas military personnel on exchange as well as some Navy and Army personnel. Some 104476 postings and attachments were recorded for these personnel. The posting records for the following groups were excluded to obtain a group for random selection of an appropriate comparison group:

- Confirmed Deseal Reseal participants. The 714 Deseal Reseal group was obtained from the DVA F-111 Chemical Exposure Microsoft Access database from the Query titled “ConfirmedAmbDesRes”.
- Overseas personnel. These were identified by unique identifying numbers >800000.
- Navy and Army personnel. These were identified by rank_code >59 on the database.
- Technical categories and musterings. These were identified as “List = null” as previously assigned in the cat_must_new table.
- Aircrew categories and musterings. These were identified as “List = A” as previously assigned in the cat_must_new table.
- Personnel leaving the RAAF at Richmond. These were identified as ‘Resignation’, ‘Discharge’ or ‘Transfer to the Reserve’ in the ‘Duty’ field in the posting table shown on the following page.

Richmond Postings Table

| Item | Number | Records for Selection of Comparison Group |
|--|--------|---|
| Total Posting/Attachments Records | | 104476 |
| Less Deseal Reseal group (714) | 820 | 103656 |
| Less Overseas personnel | 176 | 103480 |
| Less Navy and Army personnel | 0 | 103480 |
| Less Non Technical occupations | 54401 | 49079 |
| Less Aircrew occupations | 12847 | 36232 |
| Less resignations, discharges and transfers to the Reserve | 1910 | 34322 |
| Personnel eligible for comparison group | 10100 | 34322 postings records |

Prepared by Dr Warren Harrex, DVA

Appendix H : Strata Weights

Sampling Weights – All Exposed First Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=873 | Amberley Comp. Group Strata Number N=7577 | Richmond Comp. Group Strata Number N=9408 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|--------------------------------------|--|--|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 20-24 | 1995-1999 | Enlisted | 1 | 154 | 75 | 0.1145475 | 2.032467 | 0.7971939 | 1 | 0.0563589 | 0.1436884 |
| 25-29 | 1990-1994 | Enlisted | 14 | 226 | 210 | 1.603665 | 2.982711 | 2.232143 | 1 | 0.5376537 | 0.7184421 |
| 25-29 | 1995-1999 | Enlisted | 13 | 296 | 245 | 1.489118 | 3.906559 | 2.604167 | 1 | 0.381184 | 0.5718213 |
| 25-29 | 1995-1999 | NCO | 11 | 3 | 105 | 1.260023 | 0.0395935 | 1.116071 | 1 | 31.82398 | 1.128981 |
| 25-29 | 1995-1999 | Officer | 2 | 89 | 50 | 0.2290951 | 1.174607 | 0.5314626 | 1 | 0.1950397 | 0.4310653 |
| 30-34 | 1985-1989 | Enlisted | 50 | 220 | 366 | 5.727377 | 2.903524 | 3.890306 | 1 | 1.972561 | 1.472218 |
| 30-34 | 1990-1994 | Enlisted | 31 | 369 | 593 | 3.550974 | 4.870001 | 6.303146 | 1 | 0.7291525 | 0.5633653 |
| 30-34 | 1990-1994 | NCO | 8 | 12 | 90 | 0.9163803 | 0.158374 | 0.9566327 | 1 | 5.786178 | 0.9579228 |
| 30-34 | 1995-1999 | Enlisted | 10 | 193 | 126 | 1.145475 | 2.547182 | 1.339286 | 1 | 0.4497029 | 0.8552883 |
| 30-34 | 1995-1999 | NCO | 12 | 40 | 246 | 1.37457 | 0.5279135 | 2.614796 | 1 | 2.60378 | 0.5256894 |
| 35-39 | 1980-1984 | Enlisted | 62 | 175 | 310 | 7.101947 | 2.309621 | 3.295068 | 1 | 3.07494 | 2.155326 |
| 35-39 | 1985-1989 | Enlisted | 62 | 461 | 626 | 7.101947 | 6.084202 | 6.653912 | 1 | 1.167277 | 1.067334 |
| 35-39 | 1985-1989 | NCO | 7 | 27 | 37 | 0.8018327 | 0.3563416 | 0.3932823 | 1 | 2.25018 | 2.038822 |
| 35-39 | 1985-1989 | Officer | 3 | 51 | 93 | 0.3436426 | 0.6730896 | 0.9885204 | 1 | 0.5105451 | 0.3476333 |
| 35-39 | 1990-1994 | Enlisted | 14 | 159 | 224 | 1.603665 | 2.098456 | 2.380952 | 1 | 0.7642121 | 0.6735395 |
| 35-39 | 1990-1994 | NCO | 7 | 41 | 102 | 0.8018327 | 0.5411112 | 1.084184 | 1 | 1.481826 | 0.7395728 |
| 35-39 | 1990-1994 | Officer | 2 | 59 | 30 | 0.2290951 | 0.7786723 | 0.3188775 | 1 | 0.2942124 | 0.7184421 |
| 35-39 | 1995-1999 | Enlisted | 3 | 74 | 57 | 0.3436426 | 0.9766398 | 0.6058673 | 1 | 0.3518622 | 0.5671912 |
| 35-39 | 1995-1999 | NCO | 3 | 58 | 121 | 0.3436426 | 0.7654744 | 1.286139 | 1 | 0.4489276 | 0.2671892 |
| 40-44 | 1972-1979 | Enlisted | 66 | 249 | 307 | 7.560137 | 3.286261 | 3.26318 | 1 | 2.300529 | 2.3168 |

Sampling Weights – All Exposed First Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=873 | Amberley Comp. Group Strata Number N=7577 | Richmond Comp. Group Strata Number N=9408 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 40-44 | 1980-1984 | Enlisted | 50 | 368 | 608 | 5.727377 | 4.856803 | 6.462585 | 1 | 1.179248 | 0.8862363 |
| 40-44 | 1980-1984 | NCO | 7 | 15 | 52 | 0.8018327 | 0.1979675 | 0.5527211 | 1 | 4.050324 | 1.450701 |
| 40-44 | 1980-1984 | Officer | 1 | 38 | 57 | 0.1145475 | 0.5015178 | 0.6058673 | 1 | 0.2284018 | 0.1890637 |
| 40-44 | 1985-1989 | Enlisted | 26 | 234 | 352 | 2.978236 | 3.088294 | 3.741497 | 1 | 0.964363 | 0.7960013 |
| 40-44 | 1985-1989 | NCO | 9 | 88 | 153 | 1.030928 | 1.161409 | 1.626276 | 1 | 0.8876523 | 0.6339195 |
| 40-44 | 1985-1989 | Officer | 1 | 42 | 24 | 0.1145475 | 0.5543091 | 0.255102 | 1 | 0.2066492 | 0.4490263 |
| 40-44 | 1990-1994 | Enlisted | 10 | 78 | 86 | 1.145475 | 1.029431 | 0.9141157 | 1 | 1.112726 | 1.253097 |
| 40-44 | 1990-1994 | NCO | 7 | 61 | 109 | 0.8018327 | 0.805068 | 1.158588 | 1 | 0.9959815 | 0.6920773 |
| 40-44 | 1995-1999 | Enlisted | 2 | 26 | 22 | 0.2290951 | 0.3431437 | 0.2338435 | 1 | 0.6676359 | 0.9796938 |
| 40-44 | 1995-1999 | NCO | 4 | 65 | 76 | 0.4581901 | 0.8578593 | 0.8078231 | 1 | 0.5341087 | 0.5671912 |
| 45-49 | 1972-1979 | Enlisted | 71 | 315 | 585 | 8.132875 | 4.157318 | 6.218112 | 1 | 1.956279 | 1.307933 |
| 45-49 | 1972-1979 | NCO | 22 | 31 | 37 | 2.520046 | 0.4091329 | 0.3932823 | 1 | 6.15948 | 6.407727 |
| 45-49 | 1972-1979 | Officer | 3 | 58 | 40 | 0.3436426 | 0.7654744 | 0.4251701 | 1 | 0.4489276 | 0.8082474 |
| 45-49 | 1980-1984 | Enlisted | 17 | 157 | 271 | 1.947308 | 2.07206 | 2.880527 | 1 | 0.9397933 | 0.6760249 |
| 45-49 | 1980-1984 | NCO | 15 | 83 | 178 | 1.718213 | 1.09542 | 1.892007 | 1 | 1.568542 | 0.9081432 |
| 45-49 | 1980-1984 | Officer | 2 | 61 | 15 | 0.2290951 | 0.805068 | 0.1594388 | 1 | 0.2845661 | 1.436884 |
| 45-49 | 1985-1989 | Enlisted | 12 | 87 | 98 | 1.37457 | 1.148212 | 1.041667 | 1 | 1.19714 | 1.319588 |
| 45-49 | 1985-1989 | NCO | 11 | 101 | 161 | 1.260023 | 1.332981 | 1.71131 | 1 | 0.9452667 | 0.7362916 |
| 45-49 | 1985-1989 | Officer | 2 | 67 | 26 | 0.2290951 | 0.884255 | 0.2763605 | 1 | 0.2590826 | 0.8289717 |
| 45-49 | 1990-1994 | Enlisted | 8 | 14 | 33 | 0.9163803 | 0.1847697 | 0.3507653 | 1 | 4.959581 | 2.612517 |
| 45-49 | 1990-1994 | NCO | 7 | 41 | 60 | 0.8018327 | 0.5411112 | 0.6377551 | 1 | 1.481826 | 1.257274 |
| 45-49 | 1990-1994 | Officer | 2 | 44 | 10 | 0.2290951 | 0.5807047 | 0.1062925 | 1 | 0.3945121 | 2.155326 |
| 45-49 | 1995-1999 | Enlisted | 1 | 11 | 5 | 0.1145475 | 0.1451762 | 0.0531463 | 1 | 0.7890243 | 2.155326 |
| 45-49 | 1995-1999 | NCO | 2 | 45 | 26 | 0.2290951 | 0.5939026 | 0.2763605 | 1 | 0.3857452 | 0.8289717 |

Sampling Weights – All Exposed First Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=873 | Amberley Comp. Group Strata Number N=7577 | Richmond Comp. Group Strata Number N=9408 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 50-54 | 1972-1979 | Enlisted | 22 | 265 | 327 | 2.520046 | 3.497427 | 3.475765 | 1 | 0.7205428 | 0.7250333 |
| 50-54 | 1972-1979 | NCO | 31 | 154 | 240 | 3.550974 | 2.032467 | 2.55102 | 1 | 1.747125 | 1.391982 |
| 50-54 | 1980-1984 | Enlisted | 7 | 95 | 99 | 0.8018327 | 1.253794 | 1.052296 | 1 | 0.6395249 | 0.7619841 |
| 50-54 | 1980-1984 | NCO | 17 | 146 | 208 | 1.947308 | 1.926884 | 2.210884 | 1 | 1.0106 | 0.8807825 |
| 50-54 | 1980-1984 | Officer | 1 | 62 | 24 | 0.1145475 | 0.8182658 | 0.255102 | 1 | 0.1399882 | 0.4490263 |
| 50-54 | 1985-1989 | Enlisted | 2 | 23 | 27 | 0.2290951 | 0.3035502 | 0.2869898 | 1 | 0.7547188 | 0.798269 |
| 50-54 | 1985-1989 | NCO | 9 | 122 | 135 | 1.030928 | 1.610136 | 1.434949 | 1 | 0.6402737 | 0.7184421 |
| 50-54 | 1985-1989 | Officer | 1 | 65 | 16 | 0.1145475 | 0.8578593 | 0.170068 | 1 | 0.1335272 | 0.6735395 |
| 50-54 | 1990-1994 | Enlisted | 2 | 10 | 12 | 0.2290951 | 0.1319784 | 0.127551 | 1 | 1.735853 | 1.796105 |
| 50-54 | 1990-1994 | NCO | 4 | 31 | 40 | 0.4581901 | 0.4091329 | 0.4251701 | 1 | 1.119905 | 1.077663 |
| 50-54 | 1995-1999 | NCO | 2 | 13 | 13 | 0.2290951 | 0.1715719 | 0.1381803 | 1 | 1.335272 | 1.657943 |
| 50-54 | 1995-1999 | Officer | 1 | 28 | 6 | 0.1145475 | 0.3695394 | 0.0637755 | 1 | 0.3099738 | 1.796105 |
| 55-59 | 1972-1979 | Enlisted | 9 | 99 | 105 | 1.030928 | 1.306586 | 1.116071 | 1 | 0.7890242 | 0.9237112 |
| 55-59 | 1972-1979 | NCO | 32 | 137 | 261 | 3.665521 | 1.808103 | 2.774235 | 1 | 2.027274 | 1.321273 |
| 55-59 | 1972-1979 | Officer | 3 | 88 | 29 | 0.3436426 | 1.161409 | 0.3082483 | 1 | 0.2958841 | 1.114824 |
| 55-59 | 1980-1984 | Enlisted | 2 | 39 | 38 | 0.2290951 | 0.5147156 | 0.4039116 | 1 | 0.4450906 | 0.5671912 |
| 55-59 | 1980-1984 | NCO | 7 | 176 | 152 | 0.8018327 | 2.322819 | 1.615646 | 1 | 0.3451981 | 0.4962923 |
| 55-59 | 1980-1984 | Officer | 1 | 68 | 13 | 0.1145475 | 0.8974528 | 0.1381803 | 1 | 0.1276363 | 0.8289717 |
| 55-59 | 1985-1989 | Enlisted | 1 | 18 | 6 | 0.1145475 | 0.237561 | 0.0637755 | 1 | 0.4821815 | 1.796105 |
| 55-59 | 1985-1989 | NCO | 4 | 81 | 66 | 0.4581901 | 1.069025 | 0.7015306 | 1 | 0.4286058 | 0.6531292 |
| 60-64 | 1972-1979 | Enlisted | 3 | 56 | 40 | 0.3436426 | 0.7390788 | 0.4251701 | 1 | 0.4649607 | 0.8082474 |
| 60-64 | 1972-1979 | NCO | 8 | 136 | 112 | 0.9163803 | 1.794906 | 1.190476 | 1 | 0.5105451 | 0.7697595 |
| 60-64 | 1972-1979 | Officer | 1 | 69 | 25 | 0.1145475 | 0.9106507 | 0.2657313 | 1 | 0.1257865 | 0.4310653 |

Sampling Weights – All Exposed First Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=873 | Amberley Comp. Group Strata Number N=7577 | Richmond Comp. Group Strata Number N=9408 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|--------------------------------------|--|--|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 60-64 | 1980-1984 | Enlisted | 2 | 20 | 8 | 0.2290951 | 0.2639567 | 0.085034 | 1 | 0.8679267 | 2.694158 |
| 60-64 | 1980-1984 | NCO | 3 | 122 | 50 | 0.3436426 | 1.610136 | 0.5314626 | 1 | 0.2134246 | 0.6465979 |
| 60-64 | 1985-1989 | NCO | 3 | 37 | 27 | 0.3436426 | 0.4883199 | 0.2869898 | 1 | 0.7037244 | 1.197404 |
| 60-64 | 1985-1989 | Officer | 1 | 34 | 4 | 0.1145475 | 0.4487264 | 0.042517 | 1 | 0.2552725 | 2.694158 |
| 60-64 | 1990-1994 | NCO | 2 | 16 | 5 | 0.2290951 | 0.2111654 | 0.0531463 | 1 | 1.084908 | 4.310653 |
| 65-69 | 1972-1979 | Enlisted | 1 | 26 | 18 | 0.1145475 | 0.3431437 | 0.1913265 | 1 | 0.333818 | 0.5987018 |
| 65-69 | 1972-1979 | NCO | 10 | 80 | 71 | 1.145475 | 1.055827 | 0.7546769 | 1 | 1.084908 | 1.517835 |
| 65-69 | 1972-1979 | Officer | 1 | 29 | 18 | 0.1145475 | 0.3827372 | 0.1913265 | 1 | 0.2992851 | 0.5987018 |
| 65-69 | 1980-1984 | Enlisted | 1 | 7 | 2 | 0.1145475 | 0.0923849 | 0.0212585 | 1 | 1.239895 | 5.388316 |
| 65-69 | 1980-1984 | NCO | 2 | 55 | 39 | 0.2290951 | 0.725881 | 0.4145408 | 1 | 0.3156097 | 0.5526478 |
| 70-74 | 1972-1979 | NCO | 2 | 44 | 52 | 0.2290951 | 0.5807047 | 0.5527211 | 1 | 0.3945121 | 0.4144858 |
| 70-74 | 1980-1984 | NCO | 1 | 29 | 19 | 0.1145475 | 0.3827372 | 0.2019558 | 1 | 0.2992851 | 0.5671912 |
| 70-74 | 1980-1984 | Officer | 1 | 11 | 4 | 0.1145475 | 0.1451762 | 0.042517 | 1 | 0.7890243 | 2.694158 |

Sampling Weights – All Exposed Last Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=873 | Amberley Comp. Group Strata Number N=7228 | Richmond Comp. Group Strata Number N=9251 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 20-24 | 1995-1999 | Enlisted | 1 | 154 | 75 | 0.1145475 | 2.130603 | 0.8107232 | 1 | 0.053763 | 0.1412906 |
| 25-29 | 1990-1994 | Enlisted | 14 | 123 | 76 | 1.603665 | 1.701716 | 0.8215328 | 1 | 0.9423816 | 1.952041 |
| 25-29 | 1995-1999 | Enlisted | 13 | 352 | 246 | 1.489118 | 4.86995 | 2.659172 | 1 | 0.3057768 | 0.5599931 |
| 25-29 | 1995-1999 | NCO | 11 | 40 | 239 | 1.260023 | 0.5534034 | 2.583504 | 1 | 2.276861 | 0.4877185 |
| 25-29 | 1995-1999 | Officer | 2 | 101 | 51 | 0.2290951 | 1.397344 | 0.5512918 | 1 | 0.1639504 | 0.4155605 |
| 30-34 | 1985-1989 | Enlisted | 50 | 73 | 127 | 5.727377 | 1.009961 | 1.372825 | 1 | 5.670888 | 4.171966 |
| 30-34 | 1990-1994 | Enlisted | 31 | 235 | 371 | 3.550974 | 3.251245 | 4.010377 | 1 | 1.092189 | 0.8854463 |
| 30-34 | 1990-1994 | NCO | 8 | 24 | 150 | 0.9163803 | 0.3320421 | 1.621446 | 1 | 2.759832 | 0.5651622 |
| 30-34 | 1995-1999 | Enlisted | 10 | 323 | 170 | 1.145475 | 4.468733 | 1.837639 | 1 | 0.2563311 | 0.6233407 |
| 30-34 | 1995-1999 | NCO | 12 | 168 | 597 | 1.37457 | 2.324294 | 6.453356 | 1 | 0.5913926 | 0.2130009 |
| 35-39 | 1980-1984 | Enlisted | 62 | 72 | 133 | 7.101947 | 0.9961262 | 1.437682 | 1 | 7.129566 | 4.939858 |
| 35-39 | 1985-1989 | Enlisted | 62 | 245 | 433 | 7.101947 | 3.389596 | 4.680575 | 1 | 2.095219 | 1.517324 |
| 35-39 | 1985-1989 | NCO | 7 | 32 | 35 | 0.8018327 | 0.4427227 | 0.3783375 | 1 | 1.81114 | 2.119359 |
| 35-39 | 1985-1989 | Officer | 3 | 22 | 66 | 0.3436426 | 0.3043719 | 0.7134364 | 1 | 1.129022 | 0.4816724 |
| 35-39 | 1990-1994 | Enlisted | 14 | 161 | 166 | 1.603665 | 2.227449 | 1.794401 | 1 | 0.7199562 | 0.8937054 |
| 35-39 | 1990-1994 | NCO | 7 | 98 | 215 | 0.8018327 | 1.355838 | 2.324073 | 1 | 0.5913926 | 0.3450118 |
| 35-39 | 1990-1994 | Officer | 2 | 52 | 41 | 0.2290951 | 0.7194245 | 0.4431953 | 1 | 0.3184421 | 0.5169167 |
| 35-39 | 1995-1999 | Enlisted | 3 | 136 | 78 | 0.3436426 | 1.881572 | 0.8431521 | 1 | 0.1826359 | 0.407569 |
| 35-39 | 1995-1999 | NCO | 3 | 235 | 412 | 0.3436426 | 3.251245 | 4.453573 | 1 | 0.1056957 | 0.0771611 |
| 40-44 | 1972-1979 | Enlisted | 66 | 95 | 98 | 7.560137 | 1.314333 | 1.059345 | 1 | 5.75207 | 7.136616 |
| 40-44 | 1980-1984 | Enlisted | 50 | 273 | 411 | 5.727377 | 3.776978 | 4.442763 | 1 | 1.516391 | 1.289148 |
| 40-44 | 1980-1984 | NCO | 7 | 19 | 52 | 0.8018327 | 0.2628666 | 0.5621014 | 1 | 3.050341 | 1.426491 |
| 40-44 | 1980-1984 | Officer | 1 | 22 | 31 | 0.1145475 | 0.3043719 | 0.3350989 | 1 | 0.3763407 | 0.341832 |
| 40-44 | 1985-1989 | Enlisted | 26 | 134 | 304 | 2.978236 | 1.853902 | 3.286131 | 1 | 1.606469 | 0.9063047 |

Sampling Weights – All Exposed Last Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=873 | Amberley Comp. Group Strata Number N=7228 | Richmond Comp. Group Strata Number N=9251 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 40-44 | 1985-1989 | NCO | 9 | 99 | 209 | 1.030928 | 1.369673 | 2.259215 | 1 | 0.7526814 | 0.4563212 |
| 40-44 | 1985-1989 | Officer | 1 | 35 | 39 | 0.1145475 | 0.484228 | 0.4215761 | 1 | 0.236557 | 0.2717126 |
| 40-44 | 1990-1994 | Enlisted | 10 | 70 | 55 | 1.145475 | 0.968456 | 0.5945303 | 1 | 1.182785 | 1.92669 |
| 40-44 | 1990-1994 | NCO | 7 | 143 | 249 | 0.8018327 | 1.978417 | 2.691601 | 1 | 0.40529 | 0.2979018 |
| 40-44 | 1995-1999 | Enlisted | 2 | 61 | 48 | 0.2290951 | 0.8439403 | 0.5188628 | 1 | 0.2714589 | 0.441533 |
| 40-44 | 1995-1999 | NCO | 4 | 262 | 321 | 0.4581901 | 3.624793 | 3.469895 | 1 | 0.1264045 | 0.1320473 |
| 45-49 | 1972-1979 | Enlisted | 71 | 159 | 255 | 8.132875 | 2.199779 | 2.756459 | 1 | 3.697134 | 2.95048 |
| 45-49 | 1972-1979 | NCO | 22 | 21 | 29 | 2.520046 | 0.2905368 | 0.3134796 | 1 | 8.673758 | 8.038946 |
| 45-49 | 1972-1979 | Officer | 3 | 31 | 18 | 0.3436426 | 0.4288877 | 0.1945736 | 1 | 0.8012416 | 1.766132 |
| 45-49 | 1980-1984 | Enlisted | 17 | 117 | 257 | 1.947308 | 1.618705 | 2.778078 | 1 | 1.203004 | 0.7009552 |
| 45-49 | 1980-1984 | NCO | 15 | 66 | 203 | 1.718213 | 0.9131157 | 2.194357 | 1 | 1.881704 | 0.7830142 |
| 45-49 | 1980-1984 | Officer | 2 | 48 | 21 | 0.2290951 | 0.6640841 | 0.2270025 | 1 | 0.344979 | 1.009218 |
| 45-49 | 1985-1989 | Enlisted | 12 | 59 | 81 | 1.37457 | 0.8162701 | 0.875581 | 1 | 1.683965 | 1.569895 |
| 45-49 | 1985-1989 | NCO | 11 | 106 | 238 | 1.260023 | 1.466519 | 2.572695 | 1 | 0.859193 | 0.4897677 |
| 45-49 | 1985-1989 | Officer | 2 | 66 | 32 | 0.2290951 | 0.9131157 | 0.3459086 | 1 | 0.2508938 | 0.6622995 |
| 45-49 | 1990-1994 | Enlisted | 8 | 24 | 30 | 0.9163803 | 0.3320421 | 0.3242893 | 1 | 2.759832 | 2.825811 |
| 45-49 | 1990-1994 | NCO | 7 | 135 | 182 | 0.8018327 | 1.867737 | 1.967355 | 1 | 0.4293072 | 0.4075689 |
| 45-49 | 1990-1994 | Officer | 2 | 46 | 21 | 0.2290951 | 0.6364139 | 0.2270025 | 1 | 0.3599781 | 1.009218 |
| 45-49 | 1995-1999 | Enlisted | 1 | 23 | 12 | 0.1145475 | 0.318207 | 0.1297157 | 1 | 0.3599781 | 0.883066 |
| 45-49 | 1995-1999 | NCO | 2 | 151 | 148 | 0.2290951 | 2.089098 | 1.599827 | 1 | 0.1096622 | 0.1431999 |
| 50-54 | 1972-1979 | Enlisted | 22 | 120 | 145 | 2.520046 | 1.66021 | 1.567398 | 1 | 1.517908 | 1.607789 |
| 50-54 | 1972-1979 | NCO | 31 | 97 | 158 | 3.550974 | 1.342003 | 1.707923 | 1 | 2.646024 | 2.079118 |
| 50-54 | 1980-1984 | Enlisted | 7 | 77 | 85 | 0.8018327 | 1.065302 | 0.9188196 | 1 | 0.7526814 | 0.872677 |
| 50-54 | 1980-1984 | NCO | 17 | 137 | 253 | 1.947308 | 1.895407 | 2.734839 | 1 | 1.027383 | 0.7120375 |

Sampling Weights – All Exposed Last Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=873 | Amberley Comp. Group Strata Number N=7228 | Richmond Comp. Group Strata Number N=9251 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 50-54 | 1980-1984 | Officer | 1 | 54 | 22 | 0.1145475 | 0.7470946 | 0.2378121 | 1 | 0.153324 | 0.4816724 |
| 50-54 | 1985-1989 | Enlisted | 2 | 24 | 31 | 0.2290951 | 0.3320421 | 0.3350989 | 1 | 0.689958 | 0.683664 |
| 50-54 | 1985-1989 | NCO | 9 | 196 | 229 | 1.030928 | 2.711677 | 2.475408 | 1 | 0.3801809 | 0.4164678 |
| 50-54 | 1985-1989 | Officer | 1 | 59 | 24 | 0.1145475 | 0.8162701 | 0.2594314 | 1 | 0.1403304 | 0.441533 |
| 50-54 | 1990-1994 | Enlisted | 2 | 14 | 8 | 0.2290951 | 0.1936912 | 0.0864771 | 1 | 1.182785 | 2.649198 |
| 50-54 | 1990-1994 | NCO | 4 | 97 | 113 | 0.4581901 | 1.342003 | 1.22149 | 1 | 0.3414225 | 0.3751077 |
| 50-54 | 1995-1999 | NCO | 2 | 76 | 61 | 0.2290951 | 1.051466 | 0.6593882 | 1 | 0.2178815 | 0.3474358 |
| 50-54 | 1995-1999 | Officer | 1 | 91 | 18 | 0.1145475 | 1.258993 | 0.1945736 | 1 | 0.0909835 | 0.5887107 |
| 55-59 | 1972-1979 | Enlisted | 9 | 46 | 55 | 1.030928 | 0.6364139 | 0.5945303 | 1 | 1.619901 | 1.73402 |
| 55-59 | 1972-1979 | NCO | 32 | 82 | 162 | 3.665521 | 1.134477 | 1.751162 | 1 | 3.231023 | 2.093194 |
| 55-59 | 1972-1979 | Officer | 3 | 46 | 27 | 0.3436426 | 0.6364139 | 0.2918603 | 1 | 0.5399672 | 1.177421 |
| 55-59 | 1980-1984 | Enlisted | 2 | 39 | 41 | 0.2290951 | 0.5395684 | 0.4431953 | 1 | 0.4245895 | 0.5169167 |
| 55-59 | 1980-1984 | NCO | 7 | 162 | 191 | 0.8018327 | 2.241284 | 2.064642 | 1 | 0.357756 | 0.3883641 |
| 55-59 | 1980-1984 | Officer | 1 | 65 | 13 | 0.1145475 | 0.8992805 | 0.1405254 | 1 | 0.1273769 | 0.8151379 |
| 55-59 | 1985-1989 | Enlisted | 1 | 18 | 8 | 0.1145475 | 0.2490315 | 0.0864771 | 1 | 0.459972 | 1.324599 |
| 55-59 | 1985-1989 | NCO | 4 | 109 | 111 | 0.4581901 | 1.508024 | 1.19987 | 1 | 0.3038347 | 0.3818664 |
| 60-64 | 1972-1979 | Enlisted | 3 | 31 | 26 | 0.3436426 | 0.4288877 | 0.2810507 | 1 | 0.8012416 | 1.222707 |
| 60-64 | 1972-1979 | NCO | 8 | 84 | 68 | 0.9163803 | 1.162147 | 0.7350557 | 1 | 0.7885234 | 1.246681 |
| 60-64 | 1972-1979 | Officer | 1 | 44 | 19 | 0.1145475 | 0.6087438 | 0.2053832 | 1 | 0.1881704 | 0.557726 |
| 60-64 | 1980-1984 | Enlisted | 2 | 27 | 10 | 0.2290951 | 0.3735473 | 0.1080964 | 1 | 0.613296 | 2.119359 |
| 60-64 | 1980-1984 | NCO | 3 | 136 | 78 | 0.3436426 | 1.881572 | 0.8431521 | 1 | 0.1826359 | 0.407569 |
| 60-64 | 1985-1989 | NCO | 3 | 47 | 42 | 0.3436426 | 0.650249 | 0.454005 | 1 | 0.5284785 | 0.7569138 |
| 60-64 | 1985-1989 | Officer | 1 | 40 | 7 | 0.1145475 | 0.5534034 | 0.0756675 | 1 | 0.2069874 | 1.513828 |

Sampling Weights – All Exposed Last Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=873 | Amberley Comp. Group Strata Number N=7228 | Richmond Comp. Group Strata Number N=9251 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|--------------------------------------|--|--|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 60-64 | 1990-1994 | NCO | 2 | 46 | 15 | 0.2290951 | 0.6364139 | 0.1621446 | 1 | 0.3599781 | 1.412906 |
| 65-69 | 1972-1979 | Enlisted | 1 | 17 | 9 | 0.1145475 | 0.2351965 | 0.0972868 | 1 | 0.4870292 | 1.177421 |
| 65-69 | 1972-1979 | NCO | 10 | 52 | 52 | 1.145475 | 0.7194245 | 0.5621014 | 1 | 1.592211 | 2.037845 |
| 65-69 | 1972-1979 | Officer | 1 | 13 | 16 | 0.1145475 | 0.1798561 | 0.1729543 | 1 | 0.6368843 | 0.6622995 |
| 65-69 | 1980-1984 | Enlisted | 1 | 9 | 3 | 0.1145475 | 0.1245158 | 0.0324289 | 1 | 0.919944 | 3.532264 |
| 65-69 | 1980-1984 | NCO | 2 | 72 | 49 | 0.2290951 | 0.9961262 | 0.5296724 | 1 | 0.229986 | 0.4325222 |
| 70-74 | 1972-1979 | NCO | 2 | 29 | 38 | 0.2290951 | 0.4012175 | 0.4107664 | 1 | 0.5709997 | 0.557726 |
| 70-74 | 1980-1984 | NCO | 1 | 43 | 34 | 0.1145475 | 0.5949087 | 0.3675278 | 1 | 0.1925464 | 0.3116704 |
| 70-74 | 1980-1984 | Officer | 1 | 18 | 5 | 0.1145475 | 0.2490315 | 0.0540482 | 1 | 0.459972 | 2.119359 |

Sampling Weights – Program 1 First Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=389 | Amberley Comp. Group Strata Number N=5248 | Richmond Comp. Group Strata Number N=6733 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 25-29 | 1995-1999 | Enlisted | 1 | 296 | 245 | 0.2570694 | 5.640244 | 3.638794 | 1 | 0.0455777 | 0.0706469 |
| 30-34 | 1985-1989 | Enlisted | 5 | 220 | 366 | 1.285347 | 4.192073 | 5.435913 | 1 | 0.3066137 | 0.2364547 |
| 30-34 | 1995-1999 | NCO | 1 | 40 | 246 | 0.2570694 | 0.7621951 | 3.653646 | 1 | 0.3372751 | 0.0703597 |
| 35-39 | 1980-1984 | Enlisted | 34 | 175 | 310 | 8.74036 | 3.334604 | 4.604188 | 1 | 2.621109 | 1.89835 |
| 35-39 | 1985-1989 | Enlisted | 4 | 461 | 626 | 1.028278 | 8.784299 | 9.29749 | 1 | 0.1170586 | 0.1105973 |
| 35-39 | 1995-1999 | Enlisted | 1 | 74 | 57 | 0.2570694 | 1.410061 | 0.8465766 | 1 | 0.1823108 | 0.3036576 |
| 40-44 | 1972-1979 | Enlisted | 53 | 249 | 307 | 13.62468 | 4.744665 | 4.559632 | 1 | 2.871579 | 2.988109 |
| 40-44 | 1980-1984 | Enlisted | 33 | 368 | 608 | 8.483291 | 7.012195 | 9.03015 | 1 | 1.209791 | 0.9394407 |
| 40-44 | 1980-1984 | NCO | 3 | 15 | 52 | 0.7712082 | 0.2858232 | 0.7723154 | 1 | 2.6982 | 0.9985664 |
| 40-44 | 1980-1984 | Officer | 1 | 38 | 57 | 0.2570694 | 0.7240854 | 0.8465766 | 1 | 0.3550264 | 0.3036576 |
| 40-44 | 1985-1989 | Enlisted | 3 | 234 | 352 | 0.7712082 | 4.458841 | 5.227982 | 1 | 0.1729616 | 0.1475155 |
| 40-44 | 1985-1989 | NCO | 1 | 88 | 153 | 0.2570694 | 1.676829 | 2.27239 | 1 | 0.1533069 | 0.1131273 |
| 45-49 | 1972-1979 | Enlisted | 58 | 315 | 585 | 14.91003 | 6.002286 | 8.688549 | 1 | 2.484058 | 1.716055 |
| 45-49 | 1972-1979 | NCO | 20 | 31 | 37 | 5.141388 | 0.5907012 | 0.5495322 | 1 | 8.703872 | 9.355936 |
| 45-49 | 1972-1979 | Officer | 3 | 58 | 40 | 0.7712082 | 1.105183 | 0.5940888 | 1 | 0.6978105 | 1.298136 |
| 45-49 | 1980-1984 | Enlisted | 13 | 157 | 271 | 3.341902 | 2.991616 | 4.024952 | 1 | 1.117089 | 0.8302962 |
| 45-49 | 1980-1984 | NCO | 13 | 83 | 178 | 3.341902 | 1.581555 | 2.643695 | 1 | 2.113049 | 1.264103 |
| 45-49 | 1980-1984 | Officer | 2 | 61 | 15 | 0.5141388 | 1.162348 | 0.2227833 | 1 | 0.4423279 | 2.307798 |
| 45-49 | 1985-1989 | Enlisted | 1 | 87 | 98 | 0.2570694 | 1.657774 | 1.455518 | 1 | 0.155069 | 0.1766172 |
| 50-54 | 1972-1979 | Enlisted | 18 | 265 | 327 | 4.627249 | 5.049543 | 4.856676 | 1 | 0.9163699 | 0.9527605 |
| 50-54 | 1972-1979 | NCO | 24 | 154 | 240 | 6.169666 | 2.934451 | 3.564533 | 1 | 2.102494 | 1.730848 |
| 50-54 | 1980-1984 | Enlisted | 6 | 95 | 99 | 1.542416 | 1.810213 | 1.47037 | 1 | 0.8520633 | 1.048999 |
| 50-54 | 1980-1984 | NCO | 13 | 146 | 208 | 3.341902 | 2.782012 | 3.089262 | 1 | 1.201254 | 1.08178 |
| 50-54 | 1985-1989 | NCO | 2 | 122 | 135 | 0.5141388 | 2.324695 | 2.00505 | 1 | 0.221164 | 0.256422 |

Sampling Weights – Program 1 First Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=389 | Amberley Comp. Group Strata Number N=5248 | Richmond Comp. Group Strata Number N=6733 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 50-54 | 1985-1989 | Officer | 1 | 65 | 16 | 0.2570694 | 1.238567 | 0.2376355 | 1 | 0.2075539 | 1.08178 |
| 55-59 | 1972-1979 | Enlisted | 9 | 99 | 105 | 2.313625 | 1.886433 | 1.559483 | 1 | 1.226455 | 1.483584 |
| 55-59 | 1972-1979 | NCO | 28 | 137 | 261 | 7.197943 | 2.610518 | 3.87643 | 1 | 2.757285 | 1.856849 |
| 55-59 | 1972-1979 | Officer | 2 | 88 | 29 | 0.5141388 | 1.676829 | 0.4307144 | 1 | 0.3066137 | 1.193689 |
| 55-59 | 1980-1984 | Enlisted | 1 | 39 | 38 | 0.2570694 | 0.7431402 | 0.5643844 | 1 | 0.3459232 | 0.4554864 |
| 55-59 | 1980-1984 | NCO | 4 | 176 | 152 | 1.028278 | 3.353658 | 2.257538 | 1 | 0.3066137 | 0.4554864 |
| 55-59 | 1980-1984 | Officer | 1 | 68 | 13 | 0.2570694 | 1.295732 | 0.1930789 | 1 | 0.1983971 | 1.331422 |
| 55-59 | 1985-1989 | NCO | 1 | 81 | 66 | 0.2570694 | 1.543445 | 0.9802465 | 1 | 0.1665556 | 0.2622497 |
| 60-64 | 1972-1979 | Enlisted | 2 | 56 | 40 | 0.5141388 | 1.067073 | 0.5940888 | 1 | 0.4818215 | 0.8654242 |
| 60-64 | 1972-1979 | NCO | 5 | 136 | 112 | 1.285347 | 2.591463 | 1.663449 | 1 | 0.4959927 | 0.7727001 |
| 60-64 | 1972-1979 | Officer | 1 | 69 | 25 | 0.2570694 | 1.314787 | 0.3713055 | 1 | 0.1955218 | 0.6923394 |
| 60-64 | 1980-1984 | Enlisted | 1 | 20 | 8 | 0.2570694 | 0.3810976 | 0.1188178 | 1 | 0.6745501 | 2.16356 |
| 60-64 | 1980-1984 | NCO | 2 | 122 | 50 | 0.5141388 | 2.324695 | 0.742611 | 1 | 0.221164 | 0.6923394 |
| 60-64 | 1990-1994 | NCO | 1 | 16 | 5 | 0.2570694 | 0.3048781 | 0.0742611 | 1 | 0.8431876 | 3.461697 |
| 65-69 | 1972-1979 | NCO | 10 | 80 | 71 | 2.570694 | 1.52439 | 1.054508 | 1 | 1.686375 | 2.437814 |
| 65-69 | 1972-1979 | Officer | 1 | 29 | 18 | 0.2570694 | 0.5525914 | 0.26734 | 1 | 0.465207 | 0.9615824 |
| 65-69 | 1980-1984 | Enlisted | 1 | 7 | 2 | 0.2570694 | 0.1333842 | 0.0297044 | 1 | 1.927286 | 8.654242 |
| 65-69 | 1980-1984 | NCO | 2 | 55 | 39 | 0.5141388 | 1.048018 | 0.5792366 | 1 | 0.4905819 | 0.8876145 |
| 70-74 | 1972-1979 | NCO | 2 | 44 | 52 | 0.5141388 | 0.8384146 | 0.7723154 | 1 | 0.6132274 | 0.6657109 |
| 70-74 | 1980-1984 | NCO | 1 | 29 | 19 | 0.2570694 | 0.5525914 | 0.2821922 | 1 | 0.465207 | 0.9109728 |

Sampling Weights – Program 1 Last Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=389 | Amberley Comp. Group Strata Number N=4010 | Richmond Comp. Group Strata Number N=5485 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 25-29 | 1995-1999 | Enlisted | 1 | 352 | 246 | 0.2570694 | 8.778055 | 4.484959 | 1 | 0.0292855 | 0.0573181 |
| 30-34 | 1985-1989 | Enlisted | 5 | 73 | 127 | 1.285347 | 1.820449 | 2.315406 | 1 | 0.7060605 | 0.5551282 |
| 30-34 | 1995-1999 | NCO | 1 | 168 | 597 | 0.2570694 | 4.189526 | 10.88423 | 1 | 0.06136 | 0.0236185 |
| 35-39 | 1980-1984 | Enlisted | 34 | 72 | 133 | 8.74036 | 1.795511 | 2.424795 | 1 | 4.867895 | 3.604577 |
| 35-39 | 1985-1989 | Enlisted | 4 | 245 | 433 | 1.028278 | 6.109725 | 7.894257 | 1 | 0.1683018 | 0.1302564 |
| 35-39 | 1995-1999 | Enlisted | 1 | 136 | 78 | 0.2570694 | 3.391521 | 1.42206 | 1 | 0.0757977 | 0.1807725 |
| 40-44 | 1972-1979 | Enlisted | 53 | 95 | 98 | 13.62468 | 2.369077 | 1.786691 | 1 | 5.751049 | 7.625649 |
| 40-44 | 1980-1984 | Enlisted | 33 | 273 | 411 | 8.483291 | 6.80798 | 7.493163 | 1 | 1.24608 | 1.132137 |
| 40-44 | 1980-1984 | NCO | 3 | 19 | 52 | 0.7712082 | 0.4738155 | 0.9480401 | 1 | 1.627655 | 0.8134764 |
| 40-44 | 1980-1984 | Officer | 1 | 22 | 31 | 0.2570694 | 0.5486284 | 0.5651777 | 1 | 0.4685674 | 0.454847 |
| 40-44 | 1985-1989 | Enlisted | 3 | 134 | 304 | 0.7712082 | 3.341646 | 5.542388 | 1 | 0.2307869 | 0.1391473 |
| 40-44 | 1985-1989 | NCO | 1 | 99 | 209 | 0.2570694 | 2.468828 | 3.810392 | 1 | 0.1041261 | 0.0674653 |
| 45-49 | 1972-1979 | Enlisted | 58 | 159 | 255 | 14.91003 | 3.965087 | 4.649043 | 1 | 3.760327 | 3.207117 |
| 45-49 | 1972-1979 | NCO | 20 | 21 | 29 | 5.141388 | 0.5236908 | 0.5287147 | 1 | 9.817603 | 9.724315 |
| 45-49 | 1972-1979 | Officer | 3 | 31 | 18 | 0.7712082 | 0.7730674 | 0.3281677 | 1 | 0.9975951 | 2.350043 |
| 45-49 | 1980-1984 | Enlisted | 13 | 117 | 257 | 3.341902 | 2.917706 | 4.685506 | 1 | 1.145387 | 0.7132426 |
| 45-49 | 1980-1984 | NCO | 13 | 66 | 203 | 3.341902 | 1.645885 | 3.701003 | 1 | 2.030459 | 0.9029721 |
| 45-49 | 1980-1984 | Officer | 2 | 48 | 21 | 0.5141388 | 1.197008 | 0.3828624 | 1 | 0.4295201 | 1.342882 |
| 45-49 | 1985-1989 | Enlisted | 1 | 59 | 81 | 0.2570694 | 1.471322 | 1.476755 | 1 | 0.17472 | 0.1740772 |
| 50-54 | 1972-1979 | Enlisted | 18 | 120 | 145 | 4.627249 | 2.992519 | 2.643573 | 1 | 1.546273 | 1.750377 |
| 50-54 | 1972-1979 | NCO | 24 | 97 | 158 | 6.169666 | 2.418953 | 2.880584 | 1 | 2.550552 | 2.141811 |
| 50-54 | 1980-1984 | Enlisted | 6 | 77 | 85 | 1.542416 | 1.9202 | 1.549681 | 1 | 0.8032584 | 0.9953123 |
| 50-54 | 1980-1984 | NCO | 13 | 137 | 253 | 3.341902 | 3.416459 | 4.61258 | 1 | 0.9781772 | 0.7245191 |
| 50-54 | 1985-1989 | NCO | 2 | 196 | 229 | 0.5141388 | 4.887781 | 4.175023 | 1 | 0.1051886 | 0.1231464 |

Sampling Weights – Program 1 Last Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=389 | Amberley Comp. Group Strata Number N=4010 | Richmond Comp. Group Strata Number N=5485 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 50-54 | 1985-1989 | Officer | 1 | 59 | 24 | 0.2570694 | 1.471322 | 0.437557 | 1 | 0.17472 | 0.5875107 |
| 55-59 | 1972-1979 | Enlisted | 9 | 46 | 55 | 2.313625 | 1.147132 | 1.002735 | 1 | 2.016877 | 2.307315 |
| 55-59 | 1972-1979 | NCO | 28 | 82 | 162 | 7.197943 | 2.044888 | 2.95351 | 1 | 3.51997 | 2.437081 |
| 55-59 | 1972-1979 | Officer | 2 | 46 | 27 | 0.5141388 | 1.147132 | 0.4922516 | 1 | 0.4481949 | 1.044464 |
| 55-59 | 1980-1984 | Enlisted | 1 | 39 | 41 | 0.2570694 | 0.9725686 | 0.7474931 | 1 | 0.2643201 | 0.3439087 |
| 55-59 | 1980-1984 | NCO | 4 | 162 | 191 | 1.028278 | 4.0399 | 3.482224 | 1 | 0.2545305 | 0.2952933 |
| 55-59 | 1980-1984 | Officer | 1 | 65 | 13 | 0.2570694 | 1.620948 | 0.23701 | 1 | 0.1585921 | 1.084635 |
| 55-59 | 1985-1989 | NCO | 1 | 109 | 111 | 0.2570694 | 2.718204 | 2.023701 | 1 | 0.0945732 | 0.1270293 |
| 60-64 | 1972-1979 | Enlisted | 2 | 31 | 26 | 0.5141388 | 0.7730674 | 0.4740201 | 1 | 0.6650634 | 1.084635 |
| 60-64 | 1972-1979 | NCO | 5 | 84 | 68 | 1.285347 | 2.094763 | 1.239745 | 1 | 0.6136002 | 1.036784 |
| 60-64 | 1972-1979 | Officer | 1 | 44 | 19 | 0.2570694 | 1.097257 | 0.3463993 | 1 | 0.2342837 | 0.7421188 |
| 60-64 | 1980-1984 | Enlisted | 1 | 27 | 10 | 0.2570694 | 0.6733167 | 0.1823154 | 1 | 0.3817957 | 1.410026 |
| 60-64 | 1980-1984 | NCO | 2 | 136 | 78 | 0.5141388 | 3.391521 | 1.42206 | 1 | 0.1515953 | 0.3615451 |
| 60-64 | 1990-1994 | NCO | 1 | 46 | 15 | 0.2570694 | 1.147132 | 0.2734731 | 1 | 0.2240975 | 0.9400171 |
| 65-69 | 1972-1979 | NCO | 10 | 52 | 52 | 2.570694 | 1.296758 | 0.9480401 | 1 | 1.982401 | 2.711588 |
| 65-69 | 1972-1979 | Officer | 1 | 13 | 16 | 0.2570694 | 0.3241895 | 0.2917047 | 1 | 0.7929603 | 0.8812661 |
| 65-69 | 1980-1984 | Enlisted | 1 | 9 | 3 | 0.2570694 | 0.2244389 | 0.0546946 | 1 | 1.145387 | 4.700086 |
| 65-69 | 1980-1984 | NCO | 2 | 72 | 49 | 0.5141388 | 1.795511 | 0.8933455 | 1 | 0.2863468 | 0.5755207 |
| 70-74 | 1972-1979 | NCO | 2 | 29 | 38 | 0.5141388 | 0.723192 | 0.6927986 | 1 | 0.7109299 | 0.7421188 |
| 70-74 | 1980-1984 | NCO | 1 | 43 | 34 | 0.2570694 | 1.072319 | 0.6198724 | 1 | 0.2397322 | 0.4147134 |

Sampling Weights – Program 2 First Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=302 | Amberley Comp. Group Strata Number N=6272 | Richmond Comp. Group Strata Number N=8562 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 25-29 | 1990-1994 | Enlisted | 9 | 226 | 210 | 2.980132 | 3.603316 | 2.452698 | 1 | 0.8270527 | 1.215042 |
| 25-29 | 1995-1999 | Enlisted | 2 | 296 | 245 | 0.6622517 | 4.719388 | 2.861481 | 1 | 0.1403258 | 0.2314367 |
| 25-29 | 1995-1999 | NCO | 3 | 3 | 105 | 0.9933775 | 0.0478316 | 1.226349 | 1 | 20.76821 | 0.8100284 |
| 30-34 | 1985-1989 | Enlisted | 29 | 220 | 366 | 9.602649 | 3.507653 | 4.274702 | 1 | 2.737628 | 2.24639 |
| 30-34 | 1990-1994 | Enlisted | 22 | 369 | 593 | 7.284768 | 5.883291 | 6.925952 | 1 | 1.238213 | 1.051808 |
| 30-34 | 1990-1994 | NCO | 5 | 12 | 90 | 1.655629 | 0.1913265 | 1.051156 | 1 | 8.653421 | 1.575055 |
| 30-34 | 1995-1999 | Enlisted | 1 | 193 | 126 | 0.3311258 | 3.077168 | 1.471619 | 1 | 0.1076073 | 0.2250079 |
| 30-34 | 1995-1999 | NCO | 3 | 40 | 246 | 0.9933775 | 0.6377551 | 2.87316 | 1 | 1.557616 | 0.3457438 |
| 35-39 | 1980-1984 | Enlisted | 18 | 175 | 310 | 5.960265 | 2.790179 | 3.620649 | 1 | 2.136159 | 1.646187 |
| 35-39 | 1985-1989 | Enlisted | 39 | 461 | 626 | 12.91391 | 7.350128 | 7.311376 | 1 | 1.756964 | 1.766276 |
| 35-39 | 1985-1989 | NCO | 3 | 27 | 37 | 0.9933775 | 0.4304847 | 0.432142 | 1 | 2.307579 | 2.298729 |
| 35-39 | 1985-1989 | Officer | 2 | 51 | 93 | 0.6622517 | 0.8131378 | 1.086195 | 1 | 0.8144397 | 0.6096988 |
| 35-39 | 1990-1994 | Enlisted | 9 | 159 | 224 | 2.980132 | 2.535077 | 2.616211 | 1 | 1.175559 | 1.139102 |
| 35-39 | 1990-1994 | NCO | 2 | 41 | 102 | 0.6622517 | 0.653699 | 1.19131 | 1 | 1.013083 | 0.5559018 |
| 35-39 | 1990-1994 | Officer | 1 | 59 | 30 | 0.3311258 | 0.9406888 | 0.3503854 | 1 | 0.3520036 | 0.9450331 |
| 35-39 | 1995-1999 | Enlisted | 1 | 74 | 57 | 0.3311258 | 1.179847 | 0.6657323 | 1 | 0.2806515 | 0.4973858 |
| 40-44 | 1972-1979 | Enlisted | 6 | 249 | 307 | 1.986755 | 3.970026 | 3.585611 | 1 | 0.5004389 | 0.5540911 |
| 40-44 | 1980-1984 | Enlisted | 15 | 368 | 608 | 4.966887 | 5.867347 | 7.101145 | 1 | 0.8465304 | 0.6994488 |
| 40-44 | 1980-1984 | NCO | 1 | 15 | 52 | 0.3311258 | 0.2391582 | 0.6073347 | 1 | 1.384547 | 0.5452114 |
| 40-44 | 1985-1989 | Enlisted | 14 | 234 | 352 | 4.635762 | 3.730867 | 4.111189 | 1 | 1.242543 | 1.127596 |
| 40-44 | 1985-1989 | NCO | 4 | 88 | 153 | 1.324503 | 1.403061 | 1.786966 | 1 | 0.9440096 | 0.7412025 |
| 40-44 | 1990-1994 | Enlisted | 6 | 78 | 86 | 1.986755 | 1.243622 | 1.004438 | 1 | 1.597555 | 1.977976 |
| 40-44 | 1990-1994 | NCO | 6 | 61 | 109 | 1.986755 | 0.9725766 | 1.273067 | 1 | 2.042775 | 1.560605 |
| 45-49 | 1972-1979 | Enlisted | 9 | 315 | 585 | 2.980132 | 5.022321 | 6.832516 | 1 | 0.5933775 | 0.4361691 |

Sampling Weights – Program 2 First Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=302 | Amberley Comp. Group Strata Number N=6272 | Richmond Comp. Group Strata Number N=8562 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 45-49 | 1972-1979 | NCO | 4 | 31 | 37 | 1.324503 | 0.4942602 | 0.432142 | 1 | 2.679769 | 3.064972 |
| 45-49 | 1972-1979 | Officer | 1 | 58 | 40 | 0.3311258 | 0.9247449 | 0.4671806 | 1 | 0.3580726 | 0.7087748 |
| 45-49 | 1980-1984 | Enlisted | 1 | 157 | 271 | 0.3311258 | 2.503189 | 3.165148 | 1 | 0.1322816 | 0.1046162 |
| 45-49 | 1980-1984 | NCO | 7 | 83 | 178 | 2.317881 | 1.323342 | 2.078954 | 1 | 1.751536 | 1.114927 |
| 45-49 | 1985-1989 | Enlisted | 7 | 87 | 98 | 2.317881 | 1.387117 | 1.144592 | 1 | 1.671006 | 2.025071 |
| 45-49 | 1985-1989 | NCO | 4 | 101 | 161 | 1.324503 | 1.610332 | 1.880402 | 1 | 0.8225034 | 0.7043725 |
| 45-49 | 1985-1989 | Officer | 1 | 67 | 26 | 0.3311258 | 1.06824 | 0.3036674 | 1 | 0.3099733 | 1.090423 |
| 45-49 | 1990-1994 | Enlisted | 6 | 14 | 33 | 1.986755 | 0.2232143 | 0.385424 | 1 | 8.900662 | 5.154727 |
| 45-49 | 1990-1994 | NCO | 5 | 41 | 60 | 1.655629 | 0.653699 | 0.7007709 | 1 | 2.532709 | 2.362583 |
| 45-49 | 1990-1994 | Officer | 2 | 44 | 10 | 0.6622517 | 0.7015306 | 0.1167951 | 1 | 0.9440096 | 5.670198 |
| 50-54 | 1972-1979 | Enlisted | 3 | 265 | 327 | 0.9933775 | 4.225128 | 3.819201 | 1 | 0.2351118 | 0.2601008 |
| 50-54 | 1972-1979 | NCO | 8 | 154 | 240 | 2.649007 | 2.455357 | 2.803083 | 1 | 1.078868 | 0.9450331 |
| 50-54 | 1980-1984 | Enlisted | 1 | 95 | 99 | 0.3311258 | 1.514668 | 1.156272 | 1 | 0.2186128 | 0.2863736 |
| 50-54 | 1980-1984 | NCO | 3 | 146 | 208 | 0.9933775 | 2.327806 | 2.429339 | 1 | 0.4267441 | 0.4089086 |
| 50-54 | 1985-1989 | Enlisted | 1 | 23 | 27 | 0.3311258 | 0.3667092 | 0.3153469 | 1 | 0.9029658 | 1.050037 |
| 50-54 | 1985-1989 | NCO | 6 | 122 | 135 | 1.986755 | 1.945153 | 1.576734 | 1 | 1.021387 | 1.260044 |
| 50-54 | 1990-1994 | Enlisted | 1 | 10 | 12 | 0.3311258 | 0.1594388 | 0.1401542 | 1 | 2.076821 | 2.362583 |
| 50-54 | 1990-1994 | NCO | 2 | 31 | 40 | 0.6622517 | 0.4942602 | 0.4671806 | 1 | 1.339885 | 1.41755 |
| 55-59 | 1972-1979 | Enlisted | 3 | 99 | 105 | 0.9933775 | 1.578444 | 1.226349 | 1 | 0.6293398 | 0.8100284 |
| 55-59 | 1972-1979 | NCO | 5 | 137 | 261 | 1.655629 | 2.184311 | 3.048353 | 1 | 0.757964 | 0.5431225 |
| 55-59 | 1980-1984 | Enlisted | 1 | 39 | 38 | 0.3311258 | 0.6218112 | 0.4438215 | 1 | 0.5325183 | 0.7460787 |
| 55-59 | 1980-1984 | NCO | 3 | 176 | 152 | 0.9933775 | 2.806123 | 1.775286 | 1 | 0.3540036 | 0.5595591 |
| 55-59 | 1980-1984 | Officer | 1 | 68 | 13 | 0.3311258 | 1.084184 | 0.1518337 | 1 | 0.3054149 | 2.180846 |
| 55-59 | 1985-1989 | Enlisted | 1 | 18 | 6 | 0.3311258 | 0.2869898 | 0.0700771 | 1 | 1.15379 | 4.725165 |

Sampling Weights – Program 2 First Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=302 | Amberley Comp. Group Strata Number N=6272 | Richmond Comp. Group Strata Number N=8562 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|--------------------------------------|--|--|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 55-59 | 1985-1989 | NCO | 3 | 81 | 66 | 0.9933775 | 1.291454 | 0.7708479 | 1 | 0.7691931 | 1.288682 |
| 60-64 | 1972-1979 | NCO | 2 | 136 | 112 | 0.6622517 | 2.168367 | 1.308106 | 1 | 0.3054149 | 0.5062677 |
| 60-64 | 1985-1989 | NCO | 3 | 37 | 27 | 0.9933775 | 0.5899234 | 0.3153469 | 1 | 1.683909 | 3.15011 |
| 60-64 | 1985-1989 | Officer | 1 | 34 | 4 | 0.3311258 | 0.5420918 | 0.0467181 | 1 | 0.6108298 | 7.087748 |
| 60-64 | 1990-1994 | NCO | 2 | 16 | 5 | 0.6622517 | 0.255102 | 0.0583976 | 1 | 2.596026 | 11.3404 |
| 65-69 | 1972-1979 | Enlisted | 1 | 26 | 18 | 0.3311258 | 0.4145408 | 0.2102313 | 1 | 0.7987773 | 1.575055 |
| 65-69 | 1980-1984 | Enlisted | 1 | 7 | 2 | 0.3311258 | 0.1116071 | 0.023359 | 1 | 2.966887 | 14.1755 |
| 65-69 | 1980-1984 | NCO | 2 | 55 | 39 | 0.6622517 | 0.8769132 | 0.455501 | 1 | 0.7552077 | 1.453897 |

Sampling Weights – Program 2 Last Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=302 | Amberley Comp. Group Strata Number N=5417 | Richmond Comp. Group Strata Number N=7663 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 25-29 | 1990-1994 | Enlisted | 9 | 123 | 76 | 2.980132 | 2.270629 | 0.9917787 | 1 | 1.31247 | 3.004836 |
| 25-29 | 1995-1999 | Enlisted | 2 | 352 | 246 | 0.6622517 | 6.498062 | 3.210231 | 1 | 0.1019153 | 0.2062941 |
| 25-29 | 1995-1999 | NCO | 3 | 40 | 239 | 0.9933775 | 0.7384161 | 3.118883 | 1 | 1.345281 | 0.3185043 |
| 30-34 | 1985-1989 | Enlisted | 29 | 73 | 127 | 9.602649 | 1.347609 | 1.657314 | 1 | 7.125691 | 5.794102 |
| 30-34 | 1990-1994 | Enlisted | 22 | 235 | 371 | 7.284768 | 4.338194 | 4.841446 | 1 | 1.679217 | 1.504668 |
| 30-34 | 1990-1994 | NCO | 5 | 24 | 150 | 1.655629 | 0.4430497 | 1.957458 | 1 | 3.736893 | 0.8458058 |
| 30-34 | 1995-1999 | Enlisted | 1 | 323 | 170 | 0.3311258 | 5.96271 | 2.218452 | 1 | 0.0555328 | 0.1492598 |
| 30-34 | 1995-1999 | NCO | 3 | 168 | 597 | 0.9933775 | 3.101348 | 7.790682 | 1 | 0.3203051 | 0.1275084 |
| 35-39 | 1980-1984 | Enlisted | 18 | 72 | 133 | 5.960265 | 1.329149 | 1.735613 | 1 | 4.484271 | 3.434098 |
| 35-39 | 1985-1989 | Enlisted | 39 | 245 | 433 | 12.91391 | 4.522799 | 5.650528 | 1 | 2.855291 | 2.285434 |
| 35-39 | 1985-1989 | NCO | 3 | 32 | 35 | 0.9933775 | 0.5907329 | 0.4567402 | 1 | 1.681602 | 2.174929 |
| 35-39 | 1985-1989 | Officer | 2 | 22 | 66 | 0.6622517 | 0.4061289 | 0.8612815 | 1 | 1.630644 | 0.7689143 |
| 35-39 | 1990-1994 | Enlisted | 9 | 161 | 166 | 2.980132 | 2.972125 | 2.166253 | 1 | 1.002694 | 1.375708 |
| 35-39 | 1990-1994 | NCO | 2 | 98 | 215 | 0.6622517 | 1.809119 | 2.80569 | 1 | 0.366063 | 0.2360388 |
| 35-39 | 1990-1994 | Officer | 1 | 52 | 41 | 0.3311258 | 0.9599409 | 0.5350385 | 1 | 0.344944 | 0.6188823 |
| 35-39 | 1995-1999 | Enlisted | 1 | 136 | 78 | 0.3311258 | 2.510615 | 1.017878 | 1 | 0.1318903 | 0.3253099 |
| 40-44 | 1972-1979 | Enlisted | 6 | 95 | 98 | 1.986755 | 1.753738 | 1.278872 | 1 | 1.132869 | 1.553521 |
| 40-44 | 1980-1984 | Enlisted | 15 | 273 | 411 | 4.966887 | 5.03969 | 5.363435 | 1 | 0.9855542 | 0.9260647 |
| 40-44 | 1980-1984 | NCO | 1 | 19 | 52 | 0.3311258 | 0.3507476 | 0.6785854 | 1 | 0.9440572 | 0.4879648 |
| 40-44 | 1985-1989 | Enlisted | 14 | 134 | 304 | 4.635762 | 2.473694 | 3.967115 | 1 | 1.874024 | 1.168547 |
| 40-44 | 1985-1989 | NCO | 4 | 99 | 209 | 1.324503 | 1.82758 | 2.727391 | 1 | 0.7247307 | 0.4856301 |
| 40-44 | 1990-1994 | Enlisted | 6 | 70 | 55 | 1.986755 | 1.292228 | 0.7177346 | 1 | 1.537464 | 2.768091 |
| 40-44 | 1990-1994 | NCO | 6 | 143 | 249 | 1.986755 | 2.639838 | 3.24938 | 1 | 0.752605 | 0.6114259 |
| 45-49 | 1972-1979 | Enlisted | 9 | 159 | 255 | 2.980132 | 2.935204 | 3.327678 | 1 | 1.015307 | 0.895559 |

Sampling Weights – Program 2 Last Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=302 | Amberley Comp. Group Strata Number N=5417 | Richmond Comp. Group Strata Number N=7663 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 45-49 | 1972-1979 | NCO | 4 | 21 | 29 | 1.324503 | 0.3876685 | 0.3784419 | 1 | 3.416588 | 3.499886 |
| 45-49 | 1972-1979 | Officer | 1 | 31 | 18 | 0.3311258 | 0.5722725 | 0.2348949 | 1 | 0.5786157 | 1.409676 |
| 45-49 | 1980-1984 | Enlisted | 1 | 117 | 257 | 0.3311258 | 2.159867 | 3.353778 | 1 | 0.1533084 | 0.0987322 |
| 45-49 | 1980-1984 | NCO | 7 | 66 | 203 | 2.317881 | 1.218387 | 2.649093 | 1 | 1.902418 | 0.8749714 |
| 45-49 | 1985-1989 | Enlisted | 7 | 59 | 81 | 2.317881 | 1.089164 | 1.057027 | 1 | 2.128129 | 2.19283 |
| 45-49 | 1985-1989 | NCO | 4 | 106 | 238 | 1.324503 | 1.956803 | 3.105833 | 1 | 0.6768712 | 0.4264567 |
| 45-49 | 1985-1989 | Officer | 1 | 66 | 32 | 0.3311258 | 1.218387 | 0.417591 | 1 | 0.271774 | 0.7929428 |
| 45-49 | 1990-1994 | Enlisted | 6 | 24 | 30 | 1.986755 | 0.4430497 | 0.3914916 | 1 | 4.484272 | 5.074834 |
| 45-49 | 1990-1994 | NCO | 5 | 135 | 182 | 1.655629 | 2.492154 | 2.375049 | 1 | 0.6643365 | 0.6970927 |
| 45-49 | 1990-1994 | Officer | 2 | 46 | 21 | 0.6622517 | 0.8491785 | 0.2740441 | 1 | 0.7798733 | 2.416588 |
| 50-54 | 1972-1979 | Enlisted | 3 | 120 | 145 | 0.9933775 | 2.215248 | 1.892209 | 1 | 0.4484271 | 0.5249829 |
| 50-54 | 1972-1979 | NCO | 8 | 97 | 158 | 2.649007 | 1.790659 | 2.061856 | 1 | 1.479347 | 1.284768 |
| 50-54 | 1980-1984 | Enlisted | 1 | 77 | 85 | 0.3311258 | 1.421451 | 1.109226 | 1 | 0.2329492 | 0.2985197 |
| 50-54 | 1980-1984 | NCO | 3 | 137 | 253 | 0.9933775 | 2.529075 | 3.301579 | 1 | 0.3927829 | 0.3008795 |
| 50-54 | 1985-1989 | Enlisted | 1 | 24 | 31 | 0.3311258 | 0.4430497 | 0.4045413 | 1 | 0.7473786 | 0.8185217 |
| 50-54 | 1985-1989 | NCO | 6 | 196 | 229 | 1.986755 | 3.618239 | 2.988386 | 1 | 0.5490945 | 0.6648255 |
| 50-54 | 1990-1994 | Enlisted | 1 | 14 | 8 | 0.3311258 | 0.2584456 | 0.1043978 | 1 | 1.28122 | 3.171771 |
| 50-54 | 1990-1994 | NCO | 2 | 97 | 113 | 0.6622517 | 1.790659 | 1.474618 | 1 | 0.3698368 | 0.4491004 |
| 55-59 | 1972-1979 | Enlisted | 3 | 46 | 55 | 0.9933775 | 0.8491785 | 0.7177346 | 1 | 1.16981 | 1.384046 |
| 55-59 | 1972-1979 | NCO | 5 | 82 | 162 | 1.655629 | 1.513753 | 2.114054 | 1 | 1.093725 | 0.7831535 |
| 55-59 | 1980-1984 | Enlisted | 1 | 39 | 41 | 0.3311258 | 0.7199557 | 0.5350385 | 1 | 0.4599253 | 0.6188823 |
| 55-59 | 1980-1984 | NCO | 3 | 162 | 191 | 0.9933775 | 2.990585 | 2.492496 | 1 | 0.3321683 | 0.3985472 |
| 55-59 | 1980-1984 | Officer | 1 | 65 | 13 | 0.3311258 | 1.199926 | 0.1696464 | 1 | 0.2759552 | 1.951859 |
| 55-59 | 1985-1989 | Enlisted | 1 | 18 | 8 | 0.3311258 | 0.3322873 | 0.1043978 | 1 | 0.9965047 | 3.171771 |

Sampling Weights – Program 2 Last Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=302 | Amberley Comp. Group Strata Number N=5417 | Richmond Comp. Group Strata Number N=7663 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|--------------------------------------|--|--|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 55-59 | 1985-1989 | NCO | 3 | 109 | 111 | 0.9933775 | 2.012184 | 1.448519 | 1 | 0.4936813 | 0.6857885 |
| 60-64 | 1972-1979 | NCO | 2 | 84 | 68 | 0.6622517 | 1.550674 | 0.8873809 | 1 | 0.4270735 | 0.7462992 |
| 60-64 | 1985-1989 | NCO | 3 | 47 | 42 | 0.9933775 | 0.8676389 | 0.5480882 | 1 | 1.14492 | 1.812441 |
| 60-64 | 1985-1989 | Officer | 1 | 40 | 7 | 0.3311258 | 0.7384161 | 0.091348 | 1 | 0.4484272 | 3.624882 |
| 60-64 | 1990-1994 | NCO | 2 | 46 | 15 | 0.6622517 | 0.8491785 | 0.1957458 | 1 | 0.7798733 | 3.383223 |
| 65-69 | 1972-1979 | Enlisted | 1 | 17 | 9 | 0.3311258 | 0.3138268 | 0.1174475 | 1 | 1.055123 | 2.819352 |
| 65-69 | 1980-1984 | Enlisted | 1 | 9 | 3 | 0.3311258 | 0.1661436 | 0.0391492 | 1 | 1.993009 | 8.458057 |
| 65-69 | 1980-1984 | NCO | 2 | 72 | 49 | 0.6622517 | 1.329149 | 0.6394362 | 1 | 0.4982524 | 1.035681 |

Sampling Weights – Dose Response 1 First Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=160 | Amberley Comp. Group Strata Number N=5879 | Richmond Comp. Group Strata Number N=7659 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 25-29 | 1990-1994 | Enlisted | 2 | 226 | 210 | 1.25 | 3.844191 | 2.741872 | 1 | 0.3251659 | 0.4558929 |
| 25-29 | 1995-1999 | Enlisted | 4 | 296 | 245 | 2.5 | 5.03487 | 3.198851 | 1 | 0.4965372 | 0.7815306 |
| 25-29 | 1995-1999 | Officer | 1 | 89 | 50 | 0.625 | 1.513863 | 0.6528267 | 1 | 0.4128511 | 0.957375 |
| 30-34 | 1985-1989 | Enlisted | 10 | 220 | 366 | 6.25 | 3.742133 | 4.778692 | 1 | 1.670171 | 1.307889 |
| 30-34 | 1990-1994 | Enlisted | 4 | 369 | 593 | 2.5 | 6.276577 | 7.742525 | 1 | 0.3983063 | 0.3228921 |
| 30-34 | 1990-1994 | NCO | 1 | 12 | 90 | 0.625 | 0.2041163 | 1.175088 | 1 | 3.061979 | 0.531875 |
| 30-34 | 1995-1999 | Enlisted | 2 | 193 | 126 | 1.25 | 3.282871 | 1.645123 | 1 | 0.3807642 | 0.7598214 |
| 35-39 | 1980-1984 | Enlisted | 11 | 175 | 310 | 6.875 | 2.976697 | 4.047526 | 1 | 2.309607 | 1.698568 |
| 35-39 | 1985-1989 | Enlisted | 10 | 461 | 626 | 6.25 | 7.84147 | 8.17339 | 1 | 0.7970445 | 0.7646766 |
| 35-39 | 1985-1989 | NCO | 1 | 27 | 37 | 0.625 | 0.4592618 | 0.4830918 | 1 | 1.36088 | 1.29375 |
| 35-39 | 1985-1989 | Officer | 2 | 51 | 93 | 1.25 | 0.8674945 | 1.214258 | 1 | 1.440931 | 1.029436 |
| 35-39 | 1990-1994 | Enlisted | 1 | 159 | 224 | 0.625 | 2.704542 | 2.924664 | 1 | 0.2310928 | 0.2136998 |
| 35-39 | 1990-1994 | NCO | 2 | 41 | 102 | 1.25 | 0.6973975 | 1.331767 | 1 | 1.792378 | 0.9386029 |
| 35-39 | 1990-1994 | Officer | 1 | 59 | 30 | 0.625 | 1.003572 | 0.391696 | 1 | 0.6227754 | 1.595625 |
| 40-44 | 1972-1979 | Enlisted | 16 | 249 | 307 | 10 | 4.235414 | 4.008356 | 1 | 2.361044 | 2.494788 |
| 40-44 | 1980-1984 | Enlisted | 6 | 368 | 608 | 3.75 | 6.259568 | 7.938373 | 1 | 0.5990829 | 0.472389 |
| 40-44 | 1980-1984 | NCO | 3 | 15 | 52 | 1.875 | 0.2551454 | 0.6789398 | 1 | 7.34875 | 2.761659 |
| 40-44 | 1980-1984 | Officer | 1 | 38 | 57 | 0.625 | 0.6463684 | 0.7442225 | 1 | 0.9669408 | 0.8398027 |
| 40-44 | 1985-1989 | Enlisted | 5 | 234 | 352 | 3.125 | 3.980269 | 4.5959 | 1 | 0.7851229 | 0.6799539 |
| 40-44 | 1990-1994 | Enlisted | 1 | 78 | 86 | 0.625 | 1.326756 | 1.122862 | 1 | 0.4710737 | 0.5566134 |
| 45-49 | 1972-1979 | Enlisted | 14 | 315 | 585 | 8.75 | 5.358054 | 7.638073 | 1 | 1.633056 | 1.145577 |
| 45-49 | 1972-1979 | NCO | 4 | 31 | 37 | 2.5 | 0.5273005 | 0.4830918 | 1 | 4.741129 | 5.175 |
| 45-49 | 1980-1984 | Enlisted | 2 | 157 | 271 | 1.25 | 2.670522 | 3.538321 | 1 | 0.4680732 | 0.3532749 |

Sampling Weights – Dose Response 1 First Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=160 | Amberley Comp. Group Strata Number N=5879 | Richmond Comp. Group Strata Number N=7659 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 45-49 | 1980-1984 | Officer | 1 | 61 | 15 | 0.625 | 1.037591 | 0.195848 | 1 | 0.6023566 | 3.19125 |
| 45-49 | 1985-1989 | Enlisted | 1 | 87 | 98 | 0.625 | 1.479843 | 1.27954 | 1 | 0.422342 | 0.4884566 |
| 45-49 | 1985-1989 | NCO | 3 | 101 | 161 | 1.875 | 1.717979 | 2.102102 | 1 | 1.091399 | 0.8919643 |
| 45-49 | 1990-1994 | Enlisted | 1 | 14 | 33 | 0.625 | 0.2381357 | 0.4308656 | 1 | 2.624553 | 1.450568 |
| 45-49 | 1990-1994 | NCO | 3 | 41 | 60 | 1.875 | 0.6973975 | 0.7833921 | 1 | 2.688567 | 2.393438 |
| 45-49 | 1995-1999 | Enlisted | 1 | 11 | 5 | 0.625 | 0.1871067 | 0.0652827 | 1 | 3.340341 | 9.57375 |
| 45-49 | 1995-1999 | NCO | 1 | 45 | 26 | 0.625 | 0.7654363 | 0.3394699 | 1 | 0.8165278 | 1.841106 |
| 50-54 | 1972-1979 | Enlisted | 7 | 265 | 327 | 4.375 | 4.507569 | 4.269487 | 1 | 0.9705896 | 1.024713 |
| 50-54 | 1972-1979 | NCO | 5 | 154 | 240 | 3.125 | 2.619493 | 3.133568 | 1 | 1.192979 | 0.9972656 |
| 50-54 | 1980-1984 | Enlisted | 2 | 95 | 99 | 1.25 | 1.615921 | 1.292597 | 1 | 0.7735527 | 0.9670455 |
| 50-54 | 1980-1984 | NCO | 5 | 146 | 208 | 3.125 | 2.483416 | 2.715759 | 1 | 1.258348 | 1.150691 |
| 50-54 | 1985-1989 | Officer | 1 | 65 | 16 | 0.625 | 1.10563 | 0.2089045 | 1 | 0.5652885 | 2.991797 |
| 50-54 | 1995-1999 | Officer | 1 | 28 | 6 | 0.625 | 0.4762715 | 0.0783392 | 1 | 1.312277 | 7.978125 |
| 55-59 | 1972-1979 | Enlisted | 3 | 99 | 105 | 1.875 | 1.68396 | 1.370936 | 1 | 1.113447 | 1.367679 |
| 55-59 | 1972-1979 | NCO | 7 | 137 | 261 | 4.375 | 2.330328 | 3.407756 | 1 | 1.877418 | 1.283836 |
| 55-59 | 1980-1984 | Enlisted | 1 | 39 | 38 | 0.625 | 0.6633781 | 0.4961483 | 1 | 0.9421474 | 1.259704 |
| 55-59 | 1980-1984 | NCO | 3 | 176 | 152 | 1.875 | 2.993706 | 1.984593 | 1 | 0.6263139 | 0.944778 |
| 55-59 | 1985-1989 | Enlisted | 1 | 18 | 6 | 0.625 | 0.3061745 | 0.0783392 | 1 | 2.041319 | 7.978125 |
| 55-59 | 1985-1989 | NCO | 1 | 81 | 66 | 0.625 | 1.377785 | 0.8617313 | 1 | 0.4536265 | 0.7252841 |
| 60-64 | 1972-1979 | Enlisted | 1 | 56 | 40 | 0.625 | 0.952543 | 0.5222614 | 1 | 0.6561384 | 1.196719 |
| 60-64 | 1972-1979 | NCO | 2 | 136 | 112 | 1.25 | 2.313318 | 1.462332 | 1 | 0.5403493 | 0.8547991 |
| 65-69 | 1972-1979 | Enlisted | 1 | 26 | 18 | 0.625 | 0.4422521 | 0.2350176 | 1 | 1.413221 | 2.659375 |
| 65-69 | 1972-1979 | NCO | 3 | 80 | 71 | 1.875 | 1.360776 | 0.927014 | 1 | 1.377891 | 2.022623 |
| 65-69 | 1980-1984 | NCO | 1 | 55 | 39 | 0.625 | 0.9355332 | 0.5092049 | 1 | 0.6680682 | 1.227404 |

Sampling Weights – Dose Response 1 Last Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=160 | Amberley Comp. Group Strata Number N=4662 | Richmond Comp. Group Strata Number N=5939 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 25-29 | 1990-1994 | Enlisted | 2 | 123 | 76 | 1.25 | 2.638353 | 1.279677 | 1 | 0.4737805 | 0.9768093 |
| 25-29 | 1995-1999 | Enlisted | 4 | 352 | 246 | 2.5 | 7.550407 | 4.142111 | 1 | 0.331108 | 0.6035569 |
| 25-29 | 1995-1999 | Officer | 1 | 101 | 51 | 0.625 | 2.166452 | 0.8587304 | 1 | 0.2884901 | 0.7278186 |
| 30-34 | 1985-1989 | Enlisted | 10 | 73 | 127 | 6.25 | 1.565852 | 2.138407 | 1 | 3.991438 | 2.922736 |
| 30-34 | 1990-1994 | Enlisted | 4 | 235 | 371 | 2.5 | 5.040755 | 6.246843 | 1 | 0.4959574 | 0.4002022 |
| 30-34 | 1990-1994 | NCO | 1 | 24 | 150 | 0.625 | 0.5148005 | 2.525678 | 1 | 1.214063 | 0.2474583 |
| 30-34 | 1995-1999 | Enlisted | 2 | 323 | 170 | 1.25 | 6.928357 | 2.862435 | 1 | 0.180418 | 0.4366912 |
| 35-39 | 1980-1984 | Enlisted | 11 | 72 | 133 | 6.875 | 1.544402 | 2.239434 | 1 | 4.451562 | 3.069972 |
| 35-39 | 1985-1989 | Enlisted | 10 | 245 | 433 | 6.25 | 5.255255 | 7.29079 | 1 | 1.189286 | 0.857246 |
| 35-39 | 1985-1989 | NCO | 1 | 32 | 35 | 0.625 | 0.6864007 | 0.5893248 | 1 | 0.9105468 | 1.060536 |
| 35-39 | 1985-1989 | Officer | 2 | 22 | 66 | 1.25 | 0.4719005 | 1.111298 | 1 | 2.648864 | 1.124811 |
| 35-39 | 1990-1994 | Enlisted | 1 | 161 | 166 | 0.625 | 3.453454 | 2.795083 | 1 | 0.1809783 | 0.2236069 |
| 35-39 | 1990-1994 | NCO | 2 | 98 | 215 | 1.25 | 2.102102 | 3.620138 | 1 | 0.5946429 | 0.3452907 |
| 35-39 | 1990-1994 | officer | 1 | 52 | 41 | 0.625 | 1.115401 | 0.6903519 | 1 | 0.5603365 | 0.9053354 |
| 40-44 | 1972-1979 | Enlisted | 16 | 95 | 98 | 10 | 2.037752 | 1.650109 | 1 | 4.907368 | 6.060204 |
| 40-44 | 1980-1984 | Enlisted | 6 | 273 | 411 | 3.75 | 5.855856 | 6.920357 | 1 | 0.6403846 | 0.5418796 |
| 40-44 | 1980-1984 | NCO | 3 | 19 | 52 | 1.875 | 0.4075504 | 0.8755683 | 1 | 4.600658 | 2.141466 |
| 40-44 | 1980-1984 | Officer | 1 | 22 | 31 | 0.625 | 0.4719005 | 0.5219734 | 1 | 1.324432 | 1.197379 |
| 40-44 | 1985-1989 | Enlisted | 5 | 134 | 304 | 3.125 | 2.874303 | 5.118707 | 1 | 1.08722 | 0.6105058 |
| 40-44 | 1990-1994 | Enlisted | 1 | 70 | 55 | 0.625 | 1.501502 | 0.9260818 | 1 | 0.41625 | 0.6748863 |
| 45-49 | 1972-1979 | Enlisted | 14 | 159 | 255 | 8.75 | 3.410553 | 4.293652 | 1 | 2.565566 | 2.037892 |
| 45-49 | 1972-1979 | NCO | 4 | 21 | 29 | 2.5 | 0.4504505 | 0.4882977 | 1 | 5.55 | 5.119827 |

Sampling Weights – Dose Response 1 Last Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=160 | Amberley Comp. Group Strata Number N=4662 | Richmond Comp. Group Strata Number N=5939 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 45-49 | 1980-1984 | Enlisted | 2 | 117 | 257 | 1.25 | 2.509653 | 4.327328 | 1 | 0.4980769 | 0.2888619 |
| 45-49 | 1980-1984 | Officer | 1 | 48 | 21 | 0.625 | 1.029601 | 0.3535949 | 1 | 0.6070313 | 1.76756 |
| 45-49 | 1985-1989 | Enlisted | 1 | 59 | 81 | 0.625 | 1.265551 | 1.363866 | 1 | 0.493856 | 0.4582562 |
| 45-49 | 1985-1989 | NCO | 3 | 106 | 238 | 1.875 | 2.273702 | 4.007409 | 1 | 0.8246462 | 0.4678834 |
| 45-49 | 1990-1994 | Enlisted | 1 | 24 | 30 | 0.625 | 0.5148005 | 0.5051355 | 1 | 1.214063 | 1.237292 |
| 45-49 | 1990-1994 | NCO | 3 | 135 | 182 | 1.875 | 2.895753 | 3.064489 | 1 | 0.6475 | 0.6118475 |
| 45-49 | 1995-1999 | Enlisted | 1 | 23 | 12 | 0.625 | 0.4933505 | 0.2020542 | 1 | 1.266848 | 3.093229 |
| 45-49 | 1995-1999 | NCO | 1 | 151 | 148 | 0.625 | 3.238953 | 2.492002 | 1 | 0.1929636 | 0.2508024 |
| 50-54 | 1972-1979 | Enlisted | 7 | 120 | 145 | 4.375 | 2.574003 | 2.441489 | 1 | 1.699688 | 1.79194 |
| 50-54 | 1972-1979 | NCO | 5 | 97 | 158 | 3.125 | 2.080652 | 2.660381 | 1 | 1.501933 | 1.174644 |
| 50-54 | 1980-1984 | Enlisted | 2 | 77 | 85 | 1.25 | 1.651652 | 1.431217 | 1 | 0.7568182 | 0.8733823 |
| 50-54 | 1980-1984 | NCO | 5 | 137 | 253 | 3.125 | 2.938653 | 4.259976 | 1 | 1.063412 | 0.7335721 |
| 50-54 | 1985-1989 | Officer | 1 | 59 | 24 | 0.625 | 1.265551 | 0.4041084 | 1 | 0.493856 | 1.546615 |
| 50-54 | 1995-1999 | Officer | 1 | 91 | 18 | 0.625 | 1.951952 | 0.3030813 | 1 | 0.3201923 | 2.062153 |
| 55-59 | 1972-1979 | Enlisted | 3 | 46 | 55 | 1.875 | 0.986701 | 0.9260818 | 1 | 1.900272 | 2.024659 |
| 55-59 | 1972-1979 | NCO | 7 | 82 | 162 | 4.375 | 1.758902 | 2.727732 | 1 | 2.487348 | 1.603897 |
| 55-59 | 1980-1984 | Enlisted | 1 | 39 | 41 | 0.625 | 0.8365508 | 0.6903519 | 1 | 0.7471154 | 0.9053354 |
| 55-59 | 1980-1984 | NCO | 3 | 162 | 191 | 1.875 | 3.474904 | 3.21603 | 1 | 0.5395833 | 0.583017 |
| 55-59 | 1985-1989 | Enlisted | 1 | 18 | 8 | 0.625 | 0.3861004 | 0.1347028 | 1 | 1.61875 | 4.639843 |
| 55-59 | 1985-1989 | NCO | 1 | 109 | 111 | 0.625 | 2.338052 | 1.869002 | 1 | 0.2673165 | 0.3344032 |
| 60-64 | 1972-1979 | Enlisted | 1 | 31 | 26 | 0.625 | 0.6649507 | 0.4377841 | 1 | 0.9399194 | 1.427644 |
| 60-64 | 1972-1979 | NCO | 2 | 84 | 68 | 1.25 | 1.801802 | 1.144974 | 1 | 0.69375 | 1.091728 |
| 65-69 | 1972-1979 | Enlisted | 1 | 17 | 9 | 0.625 | 0.3646504 | 0.1515407 | 1 | 1.713971 | 4.124305 |
| 65-69 | 1972-1979 | NCO | 3 | 52 | 52 | 1.875 | 1.115401 | 0.8755683 | 1 | 1.68101 | 2.141466 |
| 65-69 | 1980-1984 | NCO | 1 | 72 | 49 | 0.625 | 1.544402 | 0.8250547 | 1 | 0.4046875 | 0.7575255 |

Sampling Weights – Dose Response 2 First Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=170 | Amberley Comp. Group Strata Number N=5431 | Richmond Comp. Group Strata Number N=7649 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 25-29 | 1990-1994 | Enlisted | 4 | 226 | 210 | 2.352941 | 4.161296 | 2.745457 | 1 | 0.5654347 | 0.8570309 |
| 25-29 | 1995-1999 | Enlisted | 1 | 296 | 245 | 0.5882353 | 5.450193 | 3.203033 | 1 | 0.1079293 | 0.1836495 |
| 25-29 | 1995-1999 | NCO | 3 | 3 | 105 | 1.764706 | 0.0552384 | 1.372728 | 1 | 31.94706 | 1.285546 |
| 30-34 | 1985-1989 | Enlisted | 4 | 220 | 366 | 2.352941 | 4.050819 | 4.784939 | 1 | 0.5808556 | 0.491739 |
| 30-34 | 1990-1994 | Enlisted | 6 | 369 | 593 | 3.529412 | 6.794329 | 7.752647 | 1 | 0.5194644 | 0.4552525 |
| 30-34 | 1990-1994 | NCO | 2 | 12 | 90 | 1.176471 | 0.2209538 | 1.176624 | 1 | 5.32451 | 0.9998693 |
| 30-34 | 1995-1999 | Enlisted | 2 | 193 | 126 | 1.176471 | 3.553673 | 1.647274 | 1 | 0.3310576 | 0.7141924 |
| 30-34 | 1995-1999 | NCO | 5 | 40 | 246 | 2.941176 | 0.7365126 | 3.216107 | 1 | 3.993382 | 0.9145146 |
| 35-39 | 1980-1984 | Enlisted | 10 | 175 | 310 | 5.882353 | 3.222243 | 4.052817 | 1 | 1.825546 | 1.451423 |
| 35-39 | 1985-1989 | Enlisted | 12 | 461 | 626 | 7.058824 | 8.488308 | 8.184076 | 1 | 0.8315937 | 0.862507 |
| 35-39 | 1985-1989 | NCO | 1 | 27 | 37 | 0.5882353 | 0.497146 | 0.4837234 | 1 | 1.183224 | 1.216057 |
| 35-39 | 1990-1994 | Enlisted | 2 | 159 | 224 | 1.176471 | 2.927638 | 2.928487 | 1 | 0.4018498 | 0.4017332 |
| 35-39 | 1995-1999 | NCO | 1 | 58 | 121 | 0.5882353 | 1.067943 | 1.581906 | 1 | 0.5508114 | 0.3718522 |
| 40-44 | 1972-1979 | Enlisted | 18 | 249 | 307 | 10.58823 | 4.584791 | 4.013597 | 1 | 2.309426 | 2.638092 |
| 40-44 | 1980-1984 | Enlisted | 15 | 368 | 608 | 8.823529 | 6.775916 | 7.948751 | 1 | 1.30219 | 1.110052 |
| 40-44 | 1985-1989 | Enlisted | 6 | 234 | 352 | 3.529412 | 4.308599 | 4.601909 | 1 | 0.8191553 | 0.7669452 |
| 40-44 | 1990-1994 | Enlisted | 3 | 78 | 86 | 1.764706 | 1.4362 | 1.12433 | 1 | 1.228733 | 1.569562 |
| 40-44 | 1990-1994 | NCO | 2 | 61 | 109 | 1.176471 | 1.123182 | 1.425023 | 1 | 1.047445 | 0.8255802 |
| 45-49 | 1972-1979 | Enlisted | 19 | 315 | 585 | 11.17647 | 5.800037 | 7.648058 | 1 | 1.926965 | 1.461347 |
| 45-49 | 1972-1979 | NCO | 4 | 31 | 37 | 2.352941 | 0.5707973 | 0.4837234 | 1 | 4.122201 | 4.864229 |
| 45-49 | 1980-1984 | Enlisted | 5 | 157 | 271 | 2.941176 | 2.890812 | 3.542947 | 1 | 1.017422 | 0.8301498 |
| 45-49 | 1980-1984 | NCO | 3 | 83 | 178 | 1.764706 | 1.528264 | 2.327101 | 1 | 1.154713 | 0.7583278 |
| 45-49 | 1980-1984 | Officer | 1 | 61 | 15 | 0.5882353 | 1.123182 | 0.1961041 | 1 | 0.5237223 | 2.999608 |

Sampling Weights – Dose Response 2 First Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=170 | Amberley Comp. Group Strata Number N=5431 | Richmond Comp. Group Strata Number N=7649 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|--------------------------------------|--|--|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 45-49 | 1985-1989 | NCO | 1 | 101 | 161 | 0.5882353 | 1.859694 | 2.10485 | 1 | 0.3163075 | 0.2794666 |
| 45-49 | 1990-1994 | Enlisted | 1 | 14 | 33 | 0.5882353 | 0.2577794 | 0.4314289 | 1 | 2.281933 | 1.363458 |
| 45-49 | 1990-1994 | Officer | 1 | 44 | 10 | 0.5882353 | 0.8101639 | 0.130736 | 1 | 0.7260696 | 4.499412 |
| 45-49 | 1995-1999 | NCO | 1 | 45 | 26 | 0.5882353 | 0.8285767 | 0.3399137 | 1 | 0.7099347 | 1.730543 |
| 50-54 | 1972-1979 | Enlisted | 5 | 265 | 327 | 2.941176 | 4.879396 | 4.275069 | 1 | 0.6027747 | 0.6879834 |
| 50-54 | 1972-1979 | NCO | 8 | 154 | 240 | 4.705883 | 2.835574 | 3.137665 | 1 | 1.659588 | 1.499804 |
| 50-54 | 1980-1984 | Enlisted | 1 | 95 | 99 | 0.5882353 | 1.749218 | 1.294287 | 1 | 0.3362848 | 0.454486 |
| 50-54 | 1980-1984 | NCO | 3 | 146 | 208 | 1.764706 | 2.688271 | 2.71931 | 1 | 0.6564464 | 0.6489536 |
| 55-59 | 1972-1979 | Enlisted | 3 | 99 | 105 | 1.764706 | 1.822869 | 1.372728 | 1 | 0.9680927 | 1.285546 |
| 55-59 | 1972-1979 | NCO | 10 | 137 | 261 | 5.882353 | 2.522556 | 3.412211 | 1 | 2.331902 | 1.723913 |
| 55-59 | 1972-1979 | Officer | 2 | 88 | 29 | 1.176471 | 1.620328 | 0.3791345 | 1 | 0.7260696 | 3.103043 |
| 55-59 | 1980-1984 | NCO | 1 | 176 | 152 | 0.5882353 | 3.240655 | 1.987188 | 1 | 0.1815174 | 0.296014 |
| 60-64 | 1972-1979 | NCO | 3 | 136 | 112 | 1.764706 | 2.504143 | 1.464244 | 1 | 0.7047145 | 1.2052 |
| 65-69 | 1980-1984 | NCO | 1 | 55 | 39 | 0.5882353 | 1.012705 | 0.5098706 | 1 | 0.5808556 | 1.153695 |

Sampling Weights – Dose Response 2 Last Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=170 | Amberley Comp. Group Strata Number N=4459 | Richmond Comp. Group Strata Number N=6667 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 25-29 | 1990-1994 | Enlisted | 4 | 123 | 76 | 2.352941 | 2.758466 | 1.139943 | 1 | 0.852989 | 2.064087 |
| 25-29 | 1995-1999 | Enlisted | 1 | 352 | 246 | 0.5882353 | 7.894146 | 3.689816 | 1 | 0.0745154 | 0.1594213 |
| 25-29 | 1995-1999 | NCO | 3 | 40 | 239 | 1.764706 | 0.8970621 | 3.584821 | 1 | 1.967206 | 0.4922717 |
| 30-34 | 1985-1989 | Enlisted | 4 | 73 | 127 | 2.352941 | 1.637138 | 1.904905 | 1 | 1.437228 | 1.235202 |
| 30-34 | 1990-1994 | Enlisted | 6 | 235 | 371 | 3.529412 | 5.27024 | 5.564722 | 1 | 0.6696872 | 0.6342477 |
| 30-34 | 1990-1994 | NCO | 2 | 24 | 150 | 1.176471 | 0.5382373 | 2.249887 | 1 | 2.185784 | 0.522902 |
| 30-34 | 1995-1999 | Enlisted | 2 | 323 | 170 | 1.176471 | 7.243777 | 2.549872 | 1 | 0.1624112 | 0.4613841 |
| 30-34 | 1995-1999 | NCO | 5 | 168 | 597 | 2.941176 | 3.767661 | 8.954553 | 1 | 0.7806373 | 0.328456 |
| 35-39 | 1980-1984 | Enlisted | 10 | 72 | 133 | 5.882353 | 1.614712 | 1.9949 | 1 | 3.642974 | 2.948695 |
| 35-39 | 1985-1989 | Enlisted | 12 | 245 | 433 | 7.058824 | 5.494505 | 6.494675 | 1 | 1.284706 | 1.086863 |
| 35-39 | 1985-1989 | NCO | 1 | 32 | 35 | 0.5882353 | 0.7176497 | 0.5249738 | 1 | 0.8196691 | 1.120504 |
| 35-39 | 1990-1994 | Enlisted | 2 | 161 | 166 | 1.176471 | 3.610675 | 2.489876 | 1 | 0.3258312 | 0.4725018 |
| 35-39 | 1995-1999 | NCO | 1 | 235 | 412 | 0.5882353 | 5.27024 | 6.179691 | 1 | 0.1116145 | 0.0951885 |
| 40-44 | 1972-1979 | Enlisted | 18 | 95 | 98 | 10.58823 | 2.130522 | 1.469926 | 1 | 4.969783 | 7.203241 |
| 40-44 | 1980-1984 | Enlisted | 15 | 273 | 411 | 8.823529 | 6.122449 | 6.164692 | 1 | 1.441176 | 1.431301 |
| 40-44 | 1985-1989 | Enlisted | 6 | 134 | 304 | 3.529412 | 3.005158 | 4.559772 | 1 | 1.174451 | 0.7740325 |
| 40-44 | 1990-1994 | Enlisted | 3 | 70 | 55 | 1.764706 | 1.569859 | 0.8249587 | 1 | 1.124118 | 2.139144 |
| 40-44 | 1990-1994 | NCO | 2 | 143 | 249 | 1.176471 | 3.206997 | 3.734813 | 1 | 0.3668449 | 0.3150012 |
| 45-49 | 1972-1979 | Enlisted | 19 | 159 | 255 | 11.17647 | 3.565822 | 3.824809 | 1 | 3.134332 | 2.922099 |
| 45-49 | 1972-1979 | NCO | 4 | 21 | 29 | 2.352941 | 0.4709576 | 0.4349782 | 1 | 4.996078 | 5.409331 |
| 45-49 | 1980-1984 | Enlisted | 5 | 117 | 257 | 2.941176 | 2.623907 | 3.854807 | 1 | 1.120915 | 0.7629892 |
| 45-49 | 1980-1984 | NCO | 3 | 66 | 203 | 1.764706 | 1.480152 | 3.044848 | 1 | 1.192246 | 0.5795711 |
| 45-49 | 1980-1984 | Officer | 1 | 48 | 21 | 0.5882353 | 1.076475 | 0.3149843 | 1 | 0.5464461 | 1.867507 |
| 45-49 | 1985-1989 | NCO | 1 | 106 | 238 | 0.5882353 | 2.377215 | 3.569822 | 1 | 0.2474473 | 0.16478 |

Sampling Weights – Dose Response 2 Last Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=170 | Amberley Comp. Group Strata Number N=4459 | Richmond Comp. Group Strata Number N=6667 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|--------------------------------------|--|--|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 45-49 | 1990-1994 | Enlisted | 1 | 24 | 30 | 0.5882353 | 0.5382373 | 0.4499775 | 1 | 1.092892 | 1.307255 |
| 45-49 | 1990-1994 | Officer | 1 | 46 | 21 | 0.5882353 | 1.031621 | 0.3149843 | 1 | 0.5702046 | 1.867507 |
| 45-49 | 1995-1999 | NCO | 1 | 151 | 148 | 0.5882353 | 3.38641 | 2.219889 | 1 | 0.1737047 | 0.2649841 |
| 50-54 | 1972-1979 | Enlisted | 5 | 120 | 145 | 2.941176 | 2.691186 | 2.174891 | 1 | 1.092892 | 1.352333 |
| 50-54 | 1972-1979 | NCO | 8 | 97 | 158 | 4.705883 | 2.175376 | 2.369881 | 1 | 2.16325 | 1.985704 |
| 50-54 | 1980-1984 | Enlisted | 1 | 77 | 85 | 0.5882353 | 1.726845 | 1.274936 | 1 | 0.3406417 | 0.4613841 |
| 50-54 | 1980-1984 | NCO | 3 | 137 | 253 | 1.764706 | 3.072438 | 3.79481 | 1 | 0.5743667 | 0.4650314 |
| 55-59 | 1972-1979 | Enlisted | 3 | 46 | 55 | 1.764706 | 1.031621 | 0.8249587 | 1 | 1.710614 | 2.139144 |
| 55-59 | 1972-1979 | NCO | 10 | 82 | 162 | 5.882353 | 1.838977 | 2.429878 | 1 | 3.198709 | 2.420842 |
| 55-59 | 1972-1979 | Officer | 2 | 46 | 27 | 1.176471 | 1.031621 | 0.4049798 | 1 | 1.140409 | 2.905011 |
| 55-59 | 1980-1984 | NCO | 1 | 162 | 191 | 0.5882353 | 3.633102 | 2.864857 | 1 | 0.16191 | 0.205328 |
| 60-64 | 1972-1979 | NCO | 3 | 84 | 68 | 1.764706 | 1.88383 | 1.019949 | 1 | 0.9367647 | 1.73019 |
| 65-69 | 1980-1984 | NCO | 1 | 72 | 49 | 0.5882353 | 1.614712 | 0.7349632 | 1 | 0.3642974 | 0.8003602 |

Sampling Weights – Dose Response 3 First Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=182 | Amberley Comp. Group Strata Number N=6187 | Richmond Comp. Group Strata Number N=8441 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 20-24 | 1995-1999 | Enlisted | 1 | 154 | 75 | 0.5494506 | 2.48909 | 0.8885203 | 1 | 0.2207436 | 0.6183883 |
| 25-29 | 1990-1994 | Enlisted | 2 | 226 | 210 | 1.098901 | 3.65282 | 2.487857 | 1 | 0.3008364 | 0.4417059 |
| 25-29 | 1995-1999 | Enlisted | 1 | 296 | 245 | 0.5494506 | 4.784225 | 2.9025 | 1 | 0.1148463 | 0.1893025 |
| 25-29 | 1995-1999 | NCO | 1 | 3 | 105 | 0.5494506 | 0.0484888 | 1.243928 | 1 | 11.3315 | 0.4417059 |
| 30-34 | 1985-1989 | Enlisted | 12 | 220 | 366 | 6.593407 | 3.555843 | 4.335979 | 1 | 1.854246 | 1.520627 |
| 30-34 | 1990-1994 | Enlisted | 5 | 369 | 593 | 2.747253 | 5.964118 | 7.025234 | 1 | 0.4606301 | 0.391055 |
| 30-34 | 1990-1994 | NCO | 1 | 12 | 90 | 0.5494506 | 0.1939551 | 1.066224 | 1 | 2.832876 | 0.5153236 |
| 30-34 | 1995-1999 | Enlisted | 1 | 193 | 126 | 0.5494506 | 3.119444 | 1.492714 | 1 | 0.1761373 | 0.3680883 |
| 30-34 | 1995-1999 | NCO | 1 | 40 | 246 | 0.5494506 | 0.6465169 | 2.914347 | 1 | 0.8498626 | 0.188533 |
| 35-39 | 1980-1984 | Enlisted | 12 | 175 | 310 | 6.593407 | 2.828511 | 3.672551 | 1 | 2.331052 | 1.795321 |
| 35-39 | 1985-1989 | Enlisted | 15 | 461 | 626 | 8.241758 | 7.451107 | 7.416183 | 1 | 1.106112 | 1.111321 |
| 35-39 | 1985-1989 | NCO | 1 | 27 | 37 | 0.5494506 | 0.4363989 | 0.4383367 | 1 | 1.259056 | 1.25349 |
| 35-39 | 1990-1994 | Enlisted | 4 | 159 | 224 | 2.197802 | 2.569905 | 2.653714 | 1 | 0.8552077 | 0.8281987 |
| 35-39 | 1990-1994 | NCO | 2 | 41 | 102 | 1.098901 | 0.6626798 | 1.208388 | 1 | 1.658269 | 0.9093946 |
| 35-39 | 1990-1994 | Officer | 1 | 59 | 30 | 0.5494506 | 0.9536124 | 0.3554081 | 1 | 0.5761781 | 1.545971 |
| 35-39 | 1995-1999 | Enlisted | 2 | 74 | 57 | 1.098901 | 1.196056 | 0.6752754 | 1 | 0.9187705 | 1.627338 |
| 35-39 | 1995-1999 | NCO | 1 | 58 | 121 | 0.5494506 | 0.9374495 | 1.433479 | 1 | 0.5861122 | 0.3832985 |
| 40-44 | 1972-1979 | Enlisted | 8 | 249 | 307 | 4.395605 | 4.024568 | 3.63701 | 1 | 1.092193 | 1.208576 |
| 40-44 | 1980-1984 | Enlisted | 11 | 368 | 608 | 6.043956 | 5.947956 | 7.202938 | 1 | 1.01614 | 0.839096 |
| 40-44 | 1980-1984 | NCO | 1 | 15 | 52 | 0.5494506 | 0.2424438 | 0.6160408 | 1 | 2.2663 | 0.8919062 |
| 40-44 | 1985-1989 | Enlisted | 4 | 234 | 352 | 2.197802 | 3.782124 | 4.170122 | 1 | 0.5811027 | 0.5270355 |
| 40-44 | 1985-1989 | NCO | 3 | 88 | 153 | 1.648352 | 1.422337 | 1.812581 | 1 | 1.158904 | 0.9093946 |

Sampling Weights – Dose Response 3 First Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=182 | Amberley Comp. Group Strata Number N=6187 | Richmond Comp. Group Strata Number N=8441 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 40-44 | 1990-1994 | Enlisted | 1 | 78 | 86 | 0.5494506 | 1.260708 | 1.018837 | 1 | 0.435827 | 0.5392922 |
| 40-44 | 1990-1994 | NCO | 1 | 61 | 109 | 0.5494506 | 0.9859383 | 1.291316 | 1 | 0.557287 | 0.4254965 |
| 40-44 | 1995-1999 | Enlisted | 1 | 26 | 22 | 0.5494506 | 0.420236 | 0.2606326 | 1 | 1.307481 | 2.108142 |
| 45-49 | 1972-1979 | Enlisted | 9 | 315 | 585 | 4.945055 | 5.091321 | 6.930459 | 1 | 0.9712716 | 0.7135249 |
| 45-49 | 1972-1979 | NCO | 4 | 31 | 37 | 2.197802 | 0.5010506 | 0.4383367 | 1 | 4.386388 | 5.013959 |
| 45-49 | 1972-1979 | Officer | 1 | 58 | 40 | 0.5494506 | 0.9374495 | 0.4738775 | 1 | 0.5861122 | 1.159478 |
| 45-49 | 1980-1984 | Enlisted | 3 | 157 | 271 | 1.648352 | 2.537579 | 3.21052 | 1 | 0.6495765 | 0.513422 |
| 45-49 | 1980-1984 | NCO | 7 | 83 | 178 | 3.846154 | 1.341523 | 2.108755 | 1 | 2.867006 | 1.823898 |
| 45-49 | 1985-1989 | Enlisted | 6 | 87 | 98 | 3.296703 | 1.406174 | 1.161 | 1 | 2.344449 | 2.839538 |
| 45-49 | 1985-1989 | NCO | 2 | 101 | 161 | 1.098901 | 1.632455 | 1.907357 | 1 | 0.6731586 | 0.5761381 |
| 45-49 | 1985-1989 | Officer | 1 | 67 | 26 | 0.5494506 | 1.082916 | 0.3080204 | 1 | 0.5073807 | 1.783812 |
| 45-49 | 1990-1994 | Enlisted | 2 | 14 | 33 | 1.098901 | 0.2262809 | 0.390949 | 1 | 4.856358 | 2.810856 |
| 45-49 | 1990-1994 | NCO | 3 | 41 | 60 | 1.648352 | 0.6626798 | 0.7108163 | 1 | 2.487403 | 2.318956 |
| 50-54 | 1972-1979 | Enlisted | 4 | 265 | 327 | 2.197802 | 4.283175 | 3.873949 | 1 | 0.5131246 | 0.5673288 |
| 50-54 | 1972-1979 | NCO | 12 | 154 | 240 | 6.593407 | 2.48909 | 2.843265 | 1 | 2.648923 | 2.318956 |
| 50-54 | 1980-1984 | Enlisted | 2 | 95 | 99 | 1.098901 | 1.535478 | 1.172847 | 1 | 0.7156738 | 0.936952 |
| 50-54 | 1980-1984 | NCO | 4 | 146 | 208 | 2.197802 | 2.359787 | 2.464163 | 1 | 0.9313563 | 0.8919062 |
| 50-54 | 1985-1989 | Enlisted | 1 | 23 | 27 | 0.5494506 | 0.3717472 | 0.3198673 | 1 | 1.478022 | 1.717745 |
| 50-54 | 1985-1989 | NCO | 4 | 122 | 135 | 2.197802 | 1.971877 | 1.599337 | 1 | 1.114574 | 1.374196 |
| 50-54 | 1990-1994 | Enlisted | 1 | 10 | 12 | 0.5494506 | 0.1616292 | 0.1421632 | 1 | 3.399451 | 3.864927 |
| 50-54 | 1990-1994 | NCO | 1 | 31 | 40 | 0.5494506 | 0.5010506 | 0.4738775 | 1 | 1.096597 | 1.159478 |
| 55-59 | 1972-1979 | Enlisted | 1 | 99 | 105 | 0.5494506 | 1.600129 | 1.243928 | 1 | 0.3433789 | 0.4417059 |

Sampling Weights – Dose Response 3 First Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=182 | Amberley Comp. Group Strata Number N=6187 | Richmond Comp. Group Strata Number N=8441 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|--------------------------------------|--|--|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 55-59 | 1972-1979 | NCO | 8 | 137 | 261 | 4.395605 | 2.21432 | 3.092051 | 1 | 1.985081 | 1.421582 |
| 55-59 | 1980-1984 | Officer | 1 | 68 | 13 | 0.5494506 | 1.099079 | 0.1540102 | 1 | 0.4999192 | 3.567625 |
| 55-59 | 1985-1989 | NCO | 2 | 81 | 66 | 1.098901 | 1.309197 | 0.7818979 | 1 | 0.8393705 | 1.405428 |
| 60-64 | 1980-1984 | Enlisted | 1 | 20 | 8 | 0.5494506 | 0.3232585 | 0.0947755 | 1 | 1.699725 | 5.79739 |
| 60-64 | 1980-1984 | NCO | 1 | 122 | 50 | 0.5494506 | 1.971877 | 0.5923469 | 1 | 0.2786435 | 0.9275824 |
| 60-64 | 1985-1989 | NCO | 2 | 37 | 27 | 1.098901 | 0.5980281 | 0.3198673 | 1 | 1.837541 | 3.435491 |
| 60-64 | 1985-1989 | Officer | 1 | 34 | 4 | 0.5494506 | 0.5495393 | 0.0473877 | 1 | 0.9998385 | 11.59478 |
| 60-64 | 1990-1994 | NCO | 2 | 16 | 5 | 1.098901 | 0.2586068 | 0.0592347 | 1 | 4.249313 | 18.55165 |
| 65-69 | 1972-1979 | NCO | 2 | 80 | 71 | 1.098901 | 1.293034 | 0.8411326 | 1 | 0.8498626 | 1.306454 |
| 65-69 | 1980-1984 | Enlisted | 1 | 7 | 2 | 0.5494506 | 0.1131405 | 0.0236939 | 1 | 4.856358 | 23.18956 |

Sampling Weights – Dose Response 3 Last Posting

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=182 | Amberley Comp. Group Strata Number N=5622 | Richmond Comp. Group Strata Number N=7885 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 20-24 | 1995-1999 | Enlisted | 1 | 154 | 75 | 0.5494506 | 2.739239 | 0.9511731 | 1 | 0.2005851 | 0.5776557 |
| 25-29 | 1990-1994 | Enlisted | 2 | 123 | 76 | 1.098901 | 2.187834 | 0.9638554 | 1 | 0.5022782 | 1.14011 |
| 25-29 | 1995-1999 | Enlisted | 1 | 352 | 246 | 0.5494506 | 6.261117 | 3.119848 | 1 | 0.087756 | 0.1761145 |
| 25-29 | 1995-1999 | NCO | 1 | 40 | 239 | 0.5494506 | 0.7114906 | 3.031072 | 1 | 0.7722528 | 0.1812727 |
| 30-34 | 1985-1989 | Enlisted | 12 | 73 | 127 | 6.593407 | 1.29847 | 1.610653 | 1 | 5.077826 | 4.093623 |
| 30-34 | 1990-1994 | Enlisted | 5 | 235 | 371 | 2.747253 | 4.180007 | 4.705136 | 1 | 0.6572364 | 0.5838838 |
| 30-34 | 1990-1994 | NCO | 1 | 24 | 150 | 0.5494506 | 0.4268943 | 1.902346 | 1 | 1.287088 | 0.2888278 |
| 30-34 | 1995-1999 | Enlisted | 1 | 323 | 170 | 0.5494506 | 5.745286 | 2.155993 | 1 | 0.095635 | 0.2548481 |
| 30-34 | 1995-1999 | NCO | 1 | 168 | 597 | 0.5494506 | 2.988261 | 7.571338 | 1 | 0.1838697 | 0.0725698 |
| 35-39 | 1980-1984 | Enlisted | 12 | 72 | 133 | 6.593407 | 1.280683 | 1.686747 | 1 | 5.148352 | 3.908948 |
| 35-39 | 1985-1989 | Enlisted | 15 | 245 | 433 | 8.241758 | 4.35788 | 5.491439 | 1 | 1.891231 | 1.500838 |
| 35-39 | 1985-1989 | NCO | 1 | 32 | 35 | 0.5494506 | 0.5691925 | 0.4438808 | 1 | 0.9653159 | 1.237834 |
| 35-39 | 1990-1994 | Enlisted | 4 | 161 | 166 | 2.197802 | 2.86375 | 2.105263 | 1 | 0.7674562 | 1.043956 |
| 35-39 | 1990-1994 | NCO | 2 | 98 | 215 | 1.098901 | 1.743152 | 2.726696 | 1 | 0.6304104 | 0.4030156 |
| 35-39 | 1990-1994 | Officer | 1 | 52 | 41 | 0.5494506 | 0.9249377 | 0.5199746 | 1 | 0.5940406 | 1.056687 |
| 35-39 | 1995-1999 | Enlisted | 2 | 136 | 78 | 1.098901 | 2.419068 | 0.98922 | 1 | 0.4542664 | 1.110876 |
| 35-39 | 1995-1999 | NCO | 1 | 235 | 412 | 0.5494506 | 4.180007 | 5.225111 | 1 | 0.1314473 | 0.1051558 |
| 40-44 | 1972-1979 | Enlisted | 8 | 95 | 98 | 4.395605 | 1.68979 | 1.242866 | 1 | 2.601273 | 3.536668 |
| 40-44 | 1980-1984 | Enlisted | 11 | 273 | 411 | 6.043956 | 4.855923 | 5.212429 | 1 | 1.244656 | 1.159528 |
| 40-44 | 1980-1984 | NCO | 1 | 19 | 52 | 0.5494506 | 0.337958 | 0.65948 | 1 | 1.625795 | 0.8331572 |
| 40-44 | 1985-1989 | Enlisted | 4 | 134 | 304 | 2.197802 | 2.383493 | 3.855422 | 1 | 0.9220929 | 0.5700549 |

Sampling Weights – Dose Response 3 Last Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=182 | Amberley Comp. Group Strata Number N=5622 | Richmond Comp. Group Strata Number N=7885 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|-----------------------------------|---|---|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 40-44 | 1985-1989 | NCO | 3 | 99 | 209 | 1.648352 | 1.760939 | 2.650602 | 1 | 0.9360639 | 0.6218781 |
| 40-44 | 1990-1994 | Enlisted | 1 | 70 | 55 | 0.5494506 | 1.245108 | 0.6975269 | 1 | 0.4412873 | 0.7877123 |
| 40-44 | 1990-1994 | NCO | 1 | 143 | 249 | 0.5494506 | 2.543579 | 3.157895 | 1 | 0.2160148 | 0.1739927 |
| 40-44 | 1995-1999 | Enlisted | 1 | 61 | 48 | 0.5494506 | 1.085023 | 0.6087508 | 1 | 0.5063952 | 0.902587 |
| 45-49 | 1972-1979 | Enlisted | 9 | 159 | 255 | 4.945055 | 2.828175 | 3.233989 | 1 | 1.748497 | 1.529089 |
| 45-49 | 1972-1979 | NCO | 4 | 21 | 29 | 2.197802 | 0.3735326 | 0.3677869 | 1 | 5.883831 | 5.975749 |
| 45-49 | 1972-1979 | Officer | 1 | 31 | 18 | 0.5494506 | 0.5514052 | 0.2282815 | 1 | 0.9964552 | 2.406899 |
| 45-49 | 1980-1984 | Enlisted | 3 | 117 | 257 | 1.648352 | 2.08111 | 3.259353 | 1 | 0.7920541 | 0.5057297 |
| 45-49 | 1980-1984 | NCO | 7 | 66 | 203 | 3.846154 | 1.173959 | 2.574509 | 1 | 3.276224 | 1.493937 |
| 45-49 | 1985-1989 | Enlisted | 6 | 59 | 81 | 3.296703 | 1.049449 | 1.027267 | 1 | 3.141367 | 3.209198 |
| 45-49 | 1985-1989 | NCO | 2 | 106 | 238 | 1.098901 | 1.88545 | 3.018389 | 1 | 0.5828323 | 0.3640687 |
| 45-49 | 1985-1989 | Officer | 1 | 66 | 32 | 0.5494506 | 1.173959 | 0.4058339 | 1 | 0.468032 | 1.353881 |
| 45-49 | 1990-1994 | Enlisted | 2 | 24 | 30 | 1.098901 | 0.4268943 | 0.3804692 | 1 | 2.574176 | 2.888279 |
| 45-49 | 1990-1994 | NCO | 3 | 135 | 182 | 1.648352 | 2.401281 | 2.30818 | 1 | 0.6864469 | 0.7141348 |
| 50-54 | 1972-1979 | Enlisted | 4 | 120 | 145 | 2.197802 | 2.134472 | 1.838935 | 1 | 1.02967 | 1.19515 |
| 50-54 | 1972-1979 | NCO | 12 | 97 | 158 | 6.593407 | 1.725365 | 2.003805 | 1 | 3.821457 | 3.290444 |
| 50-54 | 1980-1984 | Enlisted | 2 | 77 | 85 | 1.098901 | 1.369619 | 1.077996 | 1 | 0.8023406 | 1.019392 |
| 50-54 | 1980-1984 | NCO | 4 | 137 | 253 | 2.197802 | 2.436855 | 3.208624 | 1 | 0.901901 | 0.6849673 |
| 50-54 | 1985-1989 | Enlisted | 1 | 24 | 31 | 0.5494506 | 0.4268943 | 0.3931516 | 1 | 1.287088 | 1.397554 |
| 50-54 | 1985-1989 | NCO | 4 | 196 | 229 | 2.197802 | 3.486304 | 2.904248 | 1 | 0.6304104 | 0.7567542 |
| 50-54 | 1990-1994 | Enlisted | 1 | 14 | 8 | 0.5494506 | 0.2490217 | 0.1014585 | 1 | 2.206437 | 5.415522 |
| 50-54 | 1990-1994 | NCO | 1 | 97 | 113 | 0.5494506 | 1.725365 | 1.433101 | 1 | 0.3184547 | 0.3833998 |

Sampling Weights – Dose Response 3 Last Posting continued...

| Age Category | Posting Category | Rank Category | Exposed Group Strata Number N=182 | Amberley Comp. Group Strata Number N=5622 | Richmond Comp. Group Strata Number N=7885 | Exposed Group Strata Percent | Amberley Comp. Group Strata Percent | Richmond Comp. Group Strata Percent | Exposed Group Strata Weight | Amberley Comp. Group Strata Weight | Richmond Comp. Group Strata Weight |
|--------------|------------------|---------------|--------------------------------------|--|--|------------------------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------------|------------------------------------|
| 55-59 | 1972-1979 | Enlisted | 1 | 46 | 55 | 0.5494506 | 0.8182142 | 0.6975269 | 1 | 0.6715242 | 0.7877123 |
| 55-59 | 1972-1979 | NCO | 8 | 82 | 162 | 4.395605 | 1.458556 | 2.054534 | 1 | 3.013669 | 2.139466 |
| 55-59 | 1980-1984 | Officer | 1 | 65 | 13 | 0.5494506 | 1.156172 | 0.16487 | 1 | 0.4752325 | 3.332629 |
| 55-59 | 1985-1989 | NCO | 2 | 109 | 111 | 1.098901 | 1.938812 | 1.407736 | 1 | 0.5667911 | 0.7806158 |
| 60-64 | 1980-1984 | Enlisted | 1 | 27 | 10 | 0.5494506 | 0.4802561 | 0.1268231 | 1 | 1.144078 | 4.332418 |
| 60-64 | 1980-1984 | NCO | 1 | 136 | 78 | 0.5494506 | 2.419068 | 0.98922 | 1 | 0.2271332 | 0.5554382 |
| 60-64 | 1985-1989 | NCO | 2 | 47 | 42 | 1.098901 | 0.8360014 | 0.532657 | 1 | 1.314473 | 2.063056 |
| 60-64 | 1985-1989 | Officer | 1 | 40 | 7 | 0.5494506 | 0.7114906 | 0.0887762 | 1 | 0.7722528 | 6.189168 |
| 60-64 | 1990-1994 | NCO | 2 | 46 | 15 | 1.098901 | 0.8182142 | 0.1902346 | 1 | 1.343048 | 5.776557 |
| 65-69 | 1972-1979 | NCO | 2 | 52 | 52 | 1.098901 | 0.9249377 | 0.65948 | 1 | 1.188081 | 1.666314 |
| 65-69 | 1980-1984 | Enlisted | 1 | 9 | 3 | 0.5494506 | 0.1600854 | 0.0380469 | 1 | 3.432235 | 14.44139 |

**Appendix I : Characteristics of individuals selected using latest
posting date**

| | All Exposed N = 873 | | Program 1 N = 389 | | Program 2 N = 302 | | Amberley comparison N = 7228 | | Richmond comparison N = 9251 | |
|------------------------------------|--------------------------------|----------|------------------------------|----------|------------------------------|----------|---|----------|---|----------|
| | n | % | n | % | n | % | n | % | n | % |
| AGE GROUP | | | | | | | | | | |
| 20-24 | 1 | 0.1 | | | | | 154 | 2 | 75 | 1 |
| 25-29 | 40 | 5 | 1 | 0.3 | 14 | 5 | 616 | 9 | 612 | 7 |
| 30-34 | 111 | 13 | 6 | 2 | 60 | 20 | 823 | 11 | 1415 | 15 |
| 35-39 | 163 | 19 | 39 | 10 | 75 | 25 | 1053 | 15 | 1579 | 17 |
| 40-44 | 183 | 21 | 94 | 24 | 52 | 17 | 1213 | 17 | 1817 | 20 |
| 45-49 | 175 | 20 | 110 | 28 | 47 | 16 | 1052 | 15 | 1527 | 17 |
| 50-54 | 99 | 11 | 64 | 16 | 25 | 8 | 1042 | 14 | 1147 | 12 |
| 55-59 | 59 | 7 | 46 | 12 | 17 | 6 | 567 | 8 | 608 | 7 |
| 60-64 | 23 | 3 | 12 | 3 | 8 | 3 | 455 | 6 | 265 | 3 |
| 65-69 | 15 | 2 | 14 | 4 | 4 | 1 | 163 | 2 | 129 | 1 |
| 70-75 | 4 | 0.5 | 3 | 0.1 | | | 90 | 1 | 77 | 1 |
| EXPOSURE / POSTING CATEGORY | | | | | | | | | | |
| 1975-79 | 285 | 33 | 236 | 61 | 42 | 14 | 967 | 13 | 1175 | 13 |
| 1980-84 | 199 | 23 | 131 | 34 | 54 | 18 | 1456 | 20 | 1892 | 20 |
| 1985-89 | 204 | 23 | 18 | 5 | 118 | 39 | 1364 | 19 | 2016 | 22 |
| 1990-94 | 118 | 14 | 1 | 0.3 | 78 | 26 | 1268 | 18 | 1692 | 18 |
| 1995-99 | 67 | 8 | 3 | 0.1 | 10 | 3 | 2173 | 30 | 2476 | 27 |
| RANK [∞] | | | | | | | | | | |
| Enlisted | 575 | 66 | 244 | 63 | 207 | 69 | 3311 | 46 | 3847 | 42 |
| Non-Comm Off | 269 | 31 | 133 | 34 | 86 | 28 | 3064 | 42 | 4933 | 53 |
| Officer | 29 | 3 | 12 | 3 | 9 | 3 | 853 | 12 | 471 | 5 |

[∞] 62 individuals in the exposed group with missing rank were randomly allocated a rank (in the same distribution of ranks for the remainder of the group) for the purposes of matching and analysis.

Percentages may not add to 100 exactly due to rounding

Appendix J : Standardised incidence ratio for cancer compared to the Australian population, 1983–2000

| Population | Observed | Expected | Standardised Incidence Ratio | 95% Confidence Interval ♦ |
|---|-----------------|-----------------|-------------------------------------|----------------------------------|
| F-111 Exposed vs Australian Population | 27 | 18.20 | 148.36 | 97.77 - 215.84 |
| Lip | 2 | 0.71 | 280.25 | 33.94 - 1012.38 |
| Head & Neck (including buccal cavity) | 1 | 0.72 | 138.9 | 3.52 - 773.95 |
| Liver | 0 | 0.17 | 0 | 0 |
| Pancreas | 0 | 0.24 | 0 | 0 |
| Colorectal | 6 | 2.01 | 299.23 | 109.81 - 651.31 |
| Trachea, bronchus & lung | 2 | 1.26 | 158.47 | 19.19 - 572.46 |
| Melanoma | 7 | 4.01 | 174.24 | 70.06 - 359.01 |
| Breast | 1 | 0.03 | 2968.69 | 75.16 - 16540.48 |
| Prostate | 3 | 1.23 | 243.35 | 50.18 - 711.17 |
| Testis | 1 | 0.09 | 1081.29 | 1.98 - 435.17 |
| Kidney, ureter & urethra | 0 | 0.59 | 0 | 0 |
| Bladder | 0 | 0.50 | 0 | 0 |
| Eye | 1 | 0.09 | 1081.29 | 27.37 - 6024.55 |
| Brain & Central Nervous System | 0 | 0.66 | 0 | 0 |
| All lymphomas | 1 | 1.47 | 67.82 | 1.71 - 377.86 |
| Multiple myelomas | 0 | 0.17 | 0 | 0 |
| Leukaemias | 1 | 0.62 | 160.44 | 4.06 - 893.91 |

Appendix J continued...

| Population | Observed | Expected | Standardised Incidence Ratio | 95% Confidence Interval ♦ |
|--|--------------|--------------|------------------------------|---------------------------|
| Amberley comparisons vs Australian Population | 193 # | 192.9 | 100.05 | 86.43 - 115.21 |
| Lip | 7 | 6.7 | 104.52 | 42.02 - 215.36 |
| Head & Neck | 10 | 8.22 | 121.60 | 58.31 - 223.62 |
| Liver | 0 | 1.92 | 0 | 0 |
| Pancreas | 1 | 3.07 | 32.49 | 0.82 - 181.00 |
| Colorectal | 28 | 25.21 | 111.08 | 73.8 - 160.53 |
| Trachea, bronchus & lung | 16 | 17.61 | 90.86 | 51.93 - 147.56 |
| Melanoma | 40 | 37.07 | 107.90 | 77.09 - 146.94 |
| Breast | 0 | 0.38 | 0 | 0 |
| Prostate | 30 | 18.99 | 158.00 | 106.60 – 225.56 |
| Testis | 6 | 9.15 | 65.55 | 24.05 – 142.67 |
| Kidney, ureter & urethra | 5 | 6.74 | 74.18 | 24.08 – 173.10 |
| Bladder | 4 | 6.26 | 63.90 | 17.41 – 163.61 |
| Eye | 0 | 0.90 | 111.19 | 282 – 619.54 |
| Brain & Central Nervous System | 4 | 6.09 | 65.65 | 17.89 – 168.10 |
| All lymphomas | 12 | 13.62 | 88.03 | 45.48 – 153.77 |
| Multiple myelomas | 0 | 2.06 | 0 | 0 |
| Leukaemias | 6 | 6.16 | 97.48 | 35.77 – 212.17 |

1 excluded that occurred in 1982

Appendix J continued...

| Population | Observed | Expected | Standardised Incidence Ratio | 95% Confidence Interval ♦ |
|--|------------|------------|------------------------------|---------------------------|
| Richmond comparisons vs Australian Population | 184 | 194 | 94.62 | 81.44 – 109.32 |
| Lip | 5 | 7.34 | 68.15 | 22.13 – 159.08 |
| Head & Neck | 7 | 7.80 | 89.79 | 36.10 – 185.01 |
| Liver | 0 | 1.83 | 0 | 0 |
| Pancreas | 6 | 2.74 | 218.93 | 80.34 – 476.52 |
| Colorectal | 17 | 22.39 | 75.93 | 44.26 – 121.57 |
| Trachea, bronchus & lung | 11 | 14.72 | 67.91 | 32.57 – 124.89 |
| Melanoma | 47 | 41.23 | 113.98 | 83.75 – 151.57 |
| Breast | 0 | 0.37 | 0 | 0 |
| Prostate | 14 | 14.83 | 94.43 | 51.63 – 158.44 |
| Testis | 13 | 12.39 | 104.91 | 55.86 – 179.39 |
| Kidney, ureter & urethra | 8 | 6.41 | 124.85 | 53.90 – 246.01 |
| Bladder | 5 | 5.62 | 88.92 | 28.87 – 207.50 |
| Eye | 2 | 0.96 | 208.00 | 25.19 – 751.59 |
| Brain & Central Nervous System | 9 | 6.74 | 133.48 | 61.04 – 253.39 |
| All lymphomas | 13 | 15.07 | 86.27 | 45.93 – 147.52 |
| Multiple myelomas | 4 | 1.89 | 212.11 | 57.66 – 541.88 |
| Leukaemias | 6 | 6.48 | 92.61 | 33.99 – 201.57 |

♦ Calculated using the exact method

Appendix K : Standardised mortality ratio compared to the Australian population, 1975–2001

| Population | Observed | Expected | Standardised Mortality Ratio | 95% Confidence Interval ♦ |
|--|-----------------|-----------------|-------------------------------------|----------------------------------|
| F-111 Exposed vs Australian Population | 9 | 30.11 | 29.89 | 13.66 - 56.74 * |
| All malignant cancers | 6 | 6.34 | 94.54 | 34.69 - 205.78 |
| Endocrine, Nutritional & Metabolic Disorders | 0 | 0.58 | 0 | 0 |
| Mental Disorders | 0 | 1.13 | 0 | 0 |
| Nervous System Disorders | 0 | 0.65 | 0 | 0 |
| Cardiovascular Diseases | 1 | 5.65 | 17.71 | 17.71 - 98.66 * |
| Respiratory System Diseases | 0 | 0.82 | 0 | 0 |
| Digestive System Diseases | 2 | 1.10 | 182.22 | 22.07 - 658.23 |
| Genitourinary System Diseases | 0 | 0.1 | 0 | 0 |
| All External Causes | 0 | 11.96 | 0 | 0 |
| Amberley comparisons vs Australian Population | 194 | 290.11 | 66.87 | 57.79 - 76.98 * |
| All malignant cancers | 61 | 75.98 | 80.29 | 61.41 - 103.13 |
| Endocrine, Nutritional & Metabolic Disorders | 7 | 6.43 | 108.8 | 51.87 – 228.21 |
| Mental Disorders | 2 | 8.40 | 23.80 | 2.88 - 85.97 * |

Appendix K continued...

| Population | Observed | Expected | Standardised Mortality Ratio | 95% Confidence Interval ♦ |
|--|------------|---------------|------------------------------|---------------------------|
| Nervous System Disorders | 4 | 5.88 | 68.08 | 18.55 - 174.32 |
| Cardiovascular Diseases | 49 | 68.88 | 71.13 | 52.62 - 94.04 * |
| Respiratory System Diseases | 9 | 9.69 | 92.84 | 42.45 - 176.23 |
| Digestive System Diseases | 6 | 11.98 | 50.08 | 18.38 - 109.01 |
| Genitourinary System Diseases | 1 | 1.29 | 77.60 | 10.93 - 550.88 |
| All External Causes | 46 | 87.21 | 52.75 | 38.62 - 70.35 * |
| Richmond comparisons vs Australian Population | 228 | 309.34 | 73.70 | 64.45 - 83.92 * |
| All malignant cancers | 63 | 70.09 | 89.89 | 69.07 - 115.00 |
| Metabolic and Immunity Disorders | 4 | 6.26 | 63.88 | 23.97 - 170.20 |
| Mental Disorders | 2 | 11.02 | 18.15 | 2.19 - 65.57 * |
| Nervous System Disorders | 2 | 6.57 | 30.42 | 3.68 - 109.90 |
| Cardiovascular Diseases | 48 | 63.51 | 75.58 | 55.72 - 100.20 |
| Respiratory System Diseases | 2 | 9.11 | 21.96 | 2.66 - 79.33 * |
| Digestive System Diseases | 4 | 11.81 | 33.87 | 9.22 - 86.72 * |
| Genitourinary System Diseases | 0 | 1.26 | 0 | 0 |
| All External Causes | 95 | 112.53 | 84.42 | 68.30 - 103.2 |

♦ Calculated using the exact method

* $p < 0.05$