



The Independent Medical Expert Group (IMEG)

Report and recommendations on medical and scientific
aspects of the Armed Forces Compensation Scheme

March 2015

Topic 2 – Mesothelioma Report



Ministry
of Defence

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Minister of State for Defence Personnel Welfare and Veterans
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Dear Minister

IMEG advice on Medical and Scientific aspects of mesothelioma

I have pleasure in attaching the IMEG advice on mesothelioma which you requested in light of the Diffuse Mesothelioma Act 2014 and on which I updated you at CAC last week.

You asked IMEG to consider (1) the medical and scientific aspects of mesothelioma: (2) whether mesothelioma can be considered unique and deserving of special compensation arrangements: (3) whether the War Pensions and Armed Forces Compensation Schemes are appropriate and adequate for mesothelioma diagnosed on or after 27 July 2012 and finally, (4) to comment on any other medical matters raised in tRBL letter to you.

Asbestos is the cause of fibrosis of the lung (asbestosis), lung cancer and mesothelioma. Mesothelioma is a malignant tumour of the lining of the lungs or abdomen, with a median life expectation from diagnosis of between one to two years. To date there has been no effective treatment and none is emerging. The UK has the highest incidence of mesothelioma in the world, with almost all cases in men attributable to asbestos exposure some 30-50 years before the onset of symptomatic disease. Asbestos was widely used as insulation material on ships and more recently in buildings. The use of asbestos in naval ships increased greatly before and during the World Wars and naval service, especially sea-going service and ship re-fitting between 1939 and 1973, was

considered a high risk activity.

The association between mesothelioma and asbestos exposure was first described in 1960 in those working and living in the vicinity of asbestos mines in South Africa. From 1963 the Royal Navy began to replace asbestos insulation materials with glass fibre and calcium silicate and introduced respiratory protection. A unit was set up to study the health of the workforce at Devonport dockyard, which included a study of the number of cases of mesothelioma over time. A study in 1980 showed an increasing number of cases of mesothelioma from 1962 to 1977. A follow-up study looked at cases between 1979 and 1999: deaths from mesothelioma further increased from 1979 with a peak in 1991; cases then began to decline and by 1999 had reduced by a third. The predicted continuing high rates of mesothelioma until 2050 predominantly relate to those working in the construction industry, where exposure to asbestos continued until the 1980s.

Mesothelioma is unique in 3 respects: the specific causal relation to asbestos; the long latent period between exposure and symptoms; and the low level of exposure to asbestos which can cause mesothelioma. The clinical course and prognosis are poor, but in this respect mesothelioma is not unique. Other disorders including asbestos related lung cancer, some other cancers and leukaemias which can be accepted under the War Pensions Scheme also have a similarly short life expectation.

We have looked carefully at the adequacy and appropriateness of War Pensions Scheme and Armed Forces Compensation Scheme arrangements. The greatly improved control of asbestos exposure and the long latent interval of more than 20 years before the development of disease mean that mesothelioma should only very rarely, and only in the future, be an issue for AFCS covering disorders, caused on or after 6 April 2005. The War Pensions Scheme, dating back to 1917, recognises service personnel who make sacrifice and suffer personal injury by making awards to them and their dependents. This is primarily by payment of an income stream dependent on the level of disablement. We understand the income stream was introduced, at least in part, because of the preponderance of young men for whom the major consequence of injury was incapacity for paid work and inability to support their family. We recognise that special arrangements in terms of presumption of a service link were made where there is Royal Navy service of any duration on sea-going ships between 1939 and 1973 and, where entitlement is certified, disablement will be assessed at 100% from the outset. This approach is shared with the Industrial Injuries Disablement Benefit (IIDB) scheme. IIDB does not however include provision for dependents. As we have noted in the attached paper, dependents' benefits can be very significant. The Legion draws attention to cases of mesothelioma who are without eligible dependents. We recognise this. In terms of any changes to the War Pensions Scheme the suggested numbers of eligible single veterans would be very small compared with overall numbers of pensioners in the scheme. This issue arises, not because of the unique features of mesothelioma, but because of its poor prognosis, which it shares with some other pensionable disorders.

You asked us to comment on any other medical matter raised by the Legion. The Legion letter suggests that the Diffuse Mesothelioma Scheme should cover all asbestos-related disorders. This is not the case. In that regard, war pensioners may be considered relatively advantaged as war pension for disablement and death are likely also to be payable for asbestosis and lung cancer with or without asbestosis. The Legion included in their letter projected numbers of mesotheliomas in men who had served in the Royal Navy between now and 2047. The number, estimated by Professor Peto's group at London School of Hygiene and Tropical Medicine, is about 2,500, with up to a third of these estimated by the Legion to be single. It is this group, which the Legion identified as at a disadvantage, with income stream only payable for a short period during life. Defence Statistics (DS) show that disablement and death payments over the last ten years have been fairly constant and significantly less than the Legion projections. This may, in part, reflect a failure to

claim because of lack of awareness of the Scheme. I understand that as part of its campaign the Legion is raising awareness of the War Pension provisions for mesothelioma and other asbestos-related diseases.

Yours sincerely

A handwritten signature in black ink, appearing to read 'A Newman Taylor', with a stylized flourish at the end.

Professor Sir Anthony Newman Taylor, CBE, FRCP, FFOM, FMedSci
Chairman
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1. Medical and scientific aspects of mesothelioma

1. Mesothelioma is a malignant tumour of the lining of the lungs (pleura) or abdomen (peritoneum). It is a rapidly growing tumour with, in many cases, a length of life from the time of diagnosis of one to two years. To date no treatment has had an important impact on improving this. More than 90% of cases of mesothelioma in men in UK at present are attributable to the inhalation of asbestos fibres. The relationship of mesothelioma to asbestos is specific, so that the geographical distribution of mesothelioma can be used as a reliable indicator of industrial asbestos exposure 30 to 50 years earlier. The great majority of mesothelioma hotspots in UK have been major sites of shipbuilding and repair; these include Barrow, Glasgow, Belfast and Plymouth.

2. Asbestos is the name given to fibrous silicates of commercial value. There are 2 major types of asbestos: white, wavy, serpentine fibres – chrysotile; and long straight amphibole fibres – crocidolite (blue) and amosite (brown) asbestos. Asbestos is fire resistant and has been widely used as an insulation material including for boilers, pipework and bulkheads in Royal Navy ships before, during and after the Second World War until the early 1970's.

3. The death rate from mesothelioma in Great Britain is the highest in the world with, at present, some 2,500 cases each year. The annual incidence is expected to continue to rise each year until about 2017. It is anticipated that, by 2050, 90,000 cases of mesothelioma will have occurred, 65,000 of whom will have been after 2001 (1). The continuing increase in incidence is occurring particularly in those who worked in the construction industry, primarily due to the large numbers exposed until the early 1980's to amosite asbestos used in insulation board. Whereas the traditional sources of asbestos exposure, asbestos products manufacture, asbestos lagging and in shipyards, were subject to increasing regulation from the mid-1960's, the degree of exposure, particularly to amosite in the construction industry, was not recognised until the early 1980's. In a large case-control study of 622 mesothelioma patients and 1,420 population controls, published in 2009 (2), the 2 groups with the highest risks were identified:

1) Construction workers, which included carpenters, plumbers, electricians and painters. Of these, carpenters had the highest risk (OR = 36, a lifetime risk of 6%) probably attributable to sawing and drilling amosite asbestos insulation board (AIB) used as fireproofing under the building regulations of 1965.

2) Traditional high risk jobs, which included asbestos factory workers, ladders, shipbuilding, ship breaking and dockyard workers, naval personnel and others working on board ships. Of the 102 cases in this group, 46 had worked in docks, shipyards, and on non-naval ships. 26 had been in the Royal Navy.

4. In recent years, as a consequence of the increasingly effective controls in the jobs traditionally associated with asbestos exposure from the mid-1960's to early 1970's, an increasing proportion of cases of mesothelioma in UK have worked in the construction industry (3).

5. The association of mesothelioma with exposure to asbestos was first described by Wagner in 1960 (4). He reported 33 cases of mesothelioma, all but one of whom had worked or lived in the vicinity of the crocidolite asbestos mines in North Western Cape Province, South Africa. The interval from initial exposure to the development of disease was between 18 and 44 years and, of particular importance, in the majority of cases, (18 of 33), exposure to asbestos was environmental (neighbourhood), not occupational, indicating the level of exposure to asbestos necessary to cause

the disease need not be high. This observation was reinforced by the findings of a case-control study by Newhouse et al (5) of 83 cases of mesothelioma diagnosed at the London Hospital. A clear excess of cases had worked in, or lived with someone working in, an asbestos factory, but in those without occupational or domestic exposure more than twice as many cases as controls (11 v 5) lived within ½ mile of the Cape Asbestos factory in Barking.

6. Mesothelioma is one of several diseases caused by asbestos, of which pulmonary fibrosis (asbestosis), lung cancer and mesothelioma are clinically the most important. Asbestosis and lung cancer can be caused by chrysotile, crocidolite and amosite asbestos. The risk of mesothelioma is highest in those exposed to amphibole asbestos, crocidolite and amosite, although it also occurs in those exposed to industrial chrysotile.

7. The major source of exposure to asbestos in those employed by the Ministry of Defence has occurred in men, employed in dockyards in Barrow, Glasgow, Belfast, Rosyth and in the Royal Naval dockyards in Devonport. The volume of asbestos used in naval ships increased substantially before and during the world wars. From 1944-63 there was extensive use of crocidolite for insulation and fire protection and from 1950-1963 amosite was used for machinery insulation.

8. The workforce of the Royal Naval dockyard in Devonport has been the subject of particular study since the early 1960's. Some 19,000 civilians were employed in Devonport Naval dockyards at the end of the Second World War but by the mid-1960's that number had fallen to about 15,000. The majority of the workforce were civilian employees of MoD, with a minority of members of the Royal Navy. Royal Naval personnel will have included marine engineers, shipwrights and artificers working on board ship, the ship's company living on board during refits and Royal Naval personnel working ashore in the dockyard, where exposure was generally lower than on board ship. The work in the Devonport dockyard was predominantly refitting, which involved the removal and stripping of asbestos lagging, often in cramped and poorly ventilated areas, exposing asbestos ladders, strippers, as well as any others working or passing through the vicinity, to finely divided, respirable, airborne asbestos fibres. Trades not directly involved with asbestos, such as electricians, painters, welders and burners were therefore also exposed to airborne asbestos during refits. Labourers were exposed intermittently through stripping lagging, sweeping asbestos and bagging it, when they would have been exposed to high airborne concentrations. Sheers (1960) (6) estimated that of the 15,000 men employed in the dockyard in the mid-1960's, fewer than 3% were continuously involved in the handling of asbestos products, but about 50% of the rest of the workforce (some 7,000 men) had been exposed intermittently to widely varying concentrations of asbestos dust. The maximum exposures to asbestos among the dockyard workforce are considered to have occurred between 1950 and 1963. The mean interval from initial exposure to asbestos to diagnosis of mesothelioma reported in the Devonport population was 37.6 years (7).

9. From 1963, glass fibre and calcium silicate began to replace asbestos as insulation material, but asbestos continued to be removed in refit work during the 1970's and 1980's. Respiratory protection for more heavily exposed workers was introduced in the 1960's, with protective measures subsequently extended to include all potentially exposed workers.

10. In 1980 Sheers described 100 cases of mesothelioma (8), which had occurred up to 1979, in employees working in the dockyard or with service in naval vessels. He found the annual number of cases increased steadily, from 2 cases in 1962 to 12 in 1977. Deaths occurred in jobs with continuous or intermittent exposure, below deck or in dockside workshops, but also in those working in any occupation within the dockyard wall. Deaths in the surrounding city of Plymouth were not increased. In a follow-up study, Hilliard, Lovett and McGavin (9) reported 301 cases in Devonport dockyard workers between 1979 and 1999. They reported an increase in mesothelioma

deaths from 1964 with a peak in 1991. The number of cases then began to decline, with a reduction of one third by 1999. The authors attributed this to a) the reduction in the number of dockyard workers during the previous 50 years, although the reduction in the annual case number was too large to be explained solely by the smaller population at risk. Other factors they cited included b) substitution of asbestos by other insulation materials in the mid-1960's and c) improved hygiene measures in the dockyards, from the mid-1960's. This study was the first to record a decline in mesothelioma deaths in any UK work force, military or civilian. Although a single study, it is consistent with a similar reducing incidence of mesothelioma reported in the USA (10), where asbestos exposure controls were put in place at about the same time as in the Naval dockyards.

11. The greatest risk of mesothelioma amongst ex-service personnel has occurred in men who served in the Royal Navy. These have included those employed in naval dockyards, those on board ship during refits, marine engineers and engineering mechanics, whose role might include plumbing and joinery duties while at sea when they might need to remove and replace asbestos insulation to gain access to boilers or pipework. Some cases of mesothelioma have also occurred in the Royal Air Force and Army. The circumstances of exposure here relate to work on aircraft maintenance as well as contact in accommodation. For the Army, war pension claims have been received from people working in transport and in accommodation or office buildings. Of 100 war pension disablement cases recently reviewed, 86 were from the Royal Navy, 6 from the Army and 8 from the Royal Air Force. The median age group at diagnosis in all the three services was 75 – 80 years closely followed by 70 - 75 years. Duration of service was varied with some long service personnel (twenty two years plus) and others who had only done two years National Service. Most commonly, service included the decade 1955-65 i.e. 50 to 60 years ago. The principle service occupations in the majority of the Royal Naval personnel were work in boiler rooms and in engineering trades. None had job descriptions or described circumstances of exposure associated with the construction trades.

12. More recently, and for the future, deployed service, especially in developing countries, whether conflict or disaster relief, remains a potential source of asbestos exposure. This is relevant to all three services particularly the Army and special forces. Soldiers may well work amongst demolished buildings containing asbestos, an identified hazard in the World Trade Centre 9/11 destruction (11).

References:

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- (6) Newhouse, M.L. et al Mesothelioma of pleura and peritoneum following exposure to

asbestos in the London area. Br J Ind Med 1965; 22: 261-269

(7) Sheers, G. Asbestos associated disease in employees of Devonport dockyard. New York Academy of Science 1979; 330: 281-287

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(10) Hilliard, A.K. et al The rise and fall in incidence of malignant mesothelioma from a British Naval Dockyard, 1979-99. Occ Med 2003; 53: 209-212

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2. Can mesothelioma be considered unique and deserving of special arrangements?

1. Mesothelioma is unique in relation to other asbestos-related diseases, asbestosis and lung cancer, in 3 particular ways: 1) the specificity of its relationship to asbestos. This is unlike lung cancer, also caused by asbestos, whose overwhelming cause in the population is cigarette smoking, which with asbestos interacts to increase the risk of lung cancer in asbestos exposed individuals. 2) the long latent interval, in some cases more than 50 years, which can occur between initial exposure and the onset of symptoms and diagnosis. It is primarily for this reason that the companies and their insurers for whom mesothelioma patients have worked may no longer be in business. 3) in the low levels of exposure necessary to cause the disease; unlike asbestosis and attributable lung cancer, where the diseases are primarily recognised in those with occupational exposures, those living with asbestos workers and those living in the neighbourhood of an asbestos factory are also at risk of developing mesothelioma. In addition the prognosis of mesothelioma is very poor, with a median life expectation of less than one year. However, sadly, while poor, this is not unique: the prognosis for lung cancer, particularly for those with co-existing asbestosis is similar. For this reason, similar arrangements for expediting decision making and access to benefits for lung cancer attributable to asbestos have been put in place in Industrial Injuries Disablement Benefit. The War Pensions Scheme is an individual jurisdiction which can make awards for any disorder: these include some other solid cancers and leukaemias with a similarly poor prognosis.

3. Are the War Pension and Armed Forces Compensation Schemes appropriate and adequate for mesothelioma diagnosed on or after 27 July 2012?

1. Mesothelioma diagnosed at any time from 27 July 2012 in ex-military personnel will be due to asbestos exposure no later than the mid-1970s, at a time when Crown immunity applied and

compensation is through the War Pensions Scheme. In considering the adequacy of the War Pensions and Armed Forces Compensation Scheme we looked at the intention of the Scheme; how it applies to mesothelioma and, the likely financial outcomes.

2. The War Pensions Scheme recognises the sacrifice of military personnel who suffer personal injury due to military service by making awards to them and their dependents. Originally restricted to war injury, the scheme was extended after the Second World War to include any adverse health effect due to peace-time service. The scope of the Scheme is wide and anyone who has served can claim any “disablement” causally linked to service at any time from service termination. The standard of proof is not on the balance of probabilities but “reasonable doubt”. Where an injury or disorder has onset in service there is no onus on the claimant and entitlement will be given, unless there is evidence, “beyond reasonable doubt”, that service has played no part in cause or course. For claims made seven or more years from service termination the onus is on the claimant to raise a reasonable doubt by reliable evidence of a causal link to service.

3. “Disablement” is defined in the legislation as “physical or mental injury or damage or the loss of physical or mental capacity”. In terms of WHO ICIDH terminology, “disablement” best equates to “impairment”, a relatively objective concept implying a measurable loss of function and suited to a basic award covering a range of injuries and disorders. The Service Pensions Order specifies “disablement due to an injury” or “death due to or hastened by an injury”, where “injury” includes wound or disease. To decide entitlement, medical advisers first determine the “injury” or disorder underlying the claimed disablement and then, based on the case facts and applicable law, decide its causal link to service.

4. Benefit paid depends on the medically assessed degree of disablement. This is obtained by comparing the condition of the disabled person “with a normal person of the same age and sex” without taking into account earning capacity or the effect of any individual factors or extraneous circumstances. Disablement level is expressed as a percentage, where 100% attracts maximum award. Awards for less than 20% are paid as lump sum gratuities and an income stream is paid for centile assessments between 20% and 100%. The legislation includes a Table of Statutory Scheduled Assessments; these are important for their own sake and also act as signposts for all other assessments in the Scheme. The disabling effects of injury are addressed by supplementary allowances, covering mobility, care and employability. Paid instead of the civilian social security equivalents they attract slightly higher benefit rates.

5. It is long established war pensions policy for mesothelioma that where ex-service personnel have sea-going service of any duration between 1939 and 1973, it is presumed that they were exposed to asbestos. Mesothelioma accepted as attributable to service is assessed at 100% basic pension from the date of claim with supplementary benefits as appropriate. War Pension Widow(er) benefits also apply.

6. The reason that assessments of 20% or more attract an income stream, as opposed to a lump sum, is not clear. Financial considerations, given the numbers of casualties in the Great War are likely to be relevant; also, the great majority of casualties were young men, for whom the major consequence of injury or disability was incapacity for paid work with a reduced ability to support their family. War pension above all provided a secure regular income. Commutation of disablement war pension, but not dependents’ awards, was permitted by law: the Secretary of State was empowered to allow a war pensioner to commute his final assessment war pension by the payment of a lump sum, calculated relative to age at diagnosis and life expectancy, in accordance with the tables set out in the legislation. After the Great War commutation was sometimes allowed for house repairs or setting up a small business. This was considered to provide a more flexible working

pattern for the disabled person than the terms and conditions of being an employed earner. However a survey in 1935 showed that, despite careful consideration, some pensioners sustained serious loss in business ventures; at the start of the Second World War the then minister suspended commutation, since when the practice has not been restored.

7. Annual disablement and supplementary allowance awards for mesothelioma in life can be up to £32,000 tax free and taking an average life expectancy of 18 months, the income stream paid will be about £50,000. Widow(er)'s pension is also payable. Office of National Statistics (ONS) data shows that on average men of the relevant generation are three years older than their wives at marriage. Based on average longevity, a widow aged 52 years pension may be in payment for over 30 years while for one aged 72 years at her husband's death an award is likely to run for 13 years.

Based on 2014 war pensions rates and assuming service ended before 31 March 1973, the maximum amount of War Pension a Widow aged 52 would receive up until the age of 86 is Total £427,748.78 This is broken down as:

52-65	(13 Years @ 11,630.40)	£151,195.88
65	(5 years @ 12,322.98)	£61,614.90
70 +	(10 Years @ £13,156.60)	£131,566.60
80+	(6 years @ £13,895.40 in higher rate supplementary pension)	£83,372.40

A widow aged 72 will receive a Total of £188,625.20 this is broken down as:

Aged 72-80	(8 years @ £13,156.60)	£105,252.80
Ages 80	(6 years @ £13,895.40)	£83,372.40

These do not take account of annual war pensions up-rating, which in recent years has used CPI.

These compare with payments under the Diffuse Mesothelioma Payment Scheme (2014):

diagnosed at age 55 years	£172,722 is payable
diagnosed at age 75 years	£113,482 is payable

8. Were commutation of the service pension to be considered as an option for cases of mesothelioma attributable to service the lump sum generated would be:

About £35,000 for an estimated life expectation of just over 1 year from diagnosis.

About £60,000 for an estimated life expectation of 2 years from diagnosis.

In addition, dependent benefits would remain payable.

9. In their submission to minister, the Legion focuses on mesothelioma sufferers who are single, widowed or divorced and who will receive only the income stream paid during their life-time. The Mesothelioma 2014 scheme either makes awards to sufferers in life or to spouses or dependents. In contrast to the 2008 Diffuse Mesothelioma Scheme and the Pneumoconiosis Act

1990, the amount paid to the sufferer or dependent under the 2014 Act is the same. While numbers of new cases of mesothelioma will diminish over time, they are projected to continue to occur until about 2050. Similarly changing social mores and increasing longevity are likely to mean increased numbers of single men in this century. The Legion's snapshot figure of 31% males over aged 65 single, widowed or divorced may not be applicable over the whole future period. Relevant Influences are complex and act in different directions with cohort effects. The ONS statistical bulletin "Marital status population projections – 2008 based" looks at actual data for 2008 England and Wales on marital status and opposite sex cohabitation and makes projections to 2033. In the period 2008-2033 the proportion of those males aged 65 plus "never married" is predicted to increase from 7% in 2008 to 13% in 2033. This contrasts with 71% "married" in 2008 and predicted 62% in 2033. Professor Peto has projected that new Royal Navy mesothelioma case numbers will reduce beyond 2013 with a total of about 2,500 by 2050. Based on 30%, single pensioners without eligible dependents, the total cases in this group might be about 800. Currently 160,000 war disablement pensions are in payment, a number which will itself decline over the period.

10. The War Pensions Scheme applies to personal injury caused by service up to 6 April 2005 and the introduction of the Armed Forces Compensation Scheme, for injury and disorder due to service on or after that date. The Armed Forces Compensation Scheme can be claimed in service and awards are made where, on balance of probabilities, the claimed injury or disorder is causally linked to service. The Scheme is Tariff Based with a lump sum paid at 15 levels for pain and suffering; for the more serious injuries, affecting function, particularly civilian employability, there is an additional Guaranteed Income Payment. Armed Forces Compensation Scheme award recipients can sue in tort with adjustment in monies paid to avoid double compensation. There are time limits to claim but the legislation also includes a provision for late onset long latency disorders. Military exposure to asbestos at dates covered by the new Scheme should not occur other than very exceptionally overseas in combat or humanitarian missions or by accident. If a claim for mesothelioma was accepted as caused by service, the likely outcome under the Armed Forces Compensation Scheme would be award of a lump sum of £140,000 (Level 6) and a guaranteed income payment based on 75% of service salary at service termination paid from date of claim for life. As in the War Pensions Scheme, dependents' benefits apply.

11. In medical terms military occupational exposure to asbestos on or after 6 April 2005 should rarely be an issue although the AFCS structure with its lump sum, income stream and dependents' benefits is well suited to mesothelioma claims. The War Pensions Scheme originally applied only to war injury with focus on young working age men whose civilian employability was compromised by their accepted injury. The regular income stream structure addresses this. Because of the very poor prognosis for the majority of cases of mesothelioma, that structure means that only limited benefit is paid in life to the sufferer. However unlike Industrial Injuries Disablement Benefit, the War Pensions Scheme maintains support to eligible dependents after the pensioner's death, by payment of tax free dependents' benefits. In summary, while the War Pensions Scheme provides benefit to those who develop mesothelioma for only a short period, the awards to eligible dependents mean that the Scheme overall meets the stated purpose of providing recompense for sacrifice to claimants and their eligible dependents.

4. Other medical matters raised in the tRBL letter to Min (DPWV) of 18 December 2013

1. The letter to Minister implies that the Legion would want all asbestos related disorders to be covered by the new Scheme. The 2014 Act is restricted to mesothelioma diagnosed on or after

27 July 2012. Ex-service personnel with other asbestos related disorders including asbestosis, lung cancer with or without asbestosis etc are likely to be eligible for War Pension, with both disablement and death benefits.

2. The Legion letter to the Minister indicates that Professor Julian Peto, London School of Hygiene and Tropical Medicine, has estimated that about 2,500 Royal Navy veterans will die from mesothelioma between 2013 and 2047. This estimate was based on his 2009 case control study of occupational risks in the British population, where lifetime occupational histories were provided at telephone interview with over 500 male mesothelioma patients (2). In successive five year periods from 2013-2017 to 2043-47 the number of Royal Naval mesothelioma cases is estimated to reduce from:

986 in 2013-17

656 in 2018-22

486 in 2023-27

269 in 2028-32

151 in 2033-37

42 in 2038-42 and

16 cases in 2043-47

This rate of decline is steeper than that projected for the general population. This probably reflects the controls put in place in the 1960's in the Royal Naval dockyards to prevent exposure to asbestos, 10 years or more earlier than in the construction industry. From 2038 all projected deaths are in those aged 75 years or more, while for the whole period between 2013 and 2047 two thirds of the deaths occur in those aged 80 years or more.

3. Predicting the future burden of disease is necessarily subject to uncertainty. The magnitude and timing of the current mesothelioma epidemic in the UK were predicted by Professor Peto in his 1995 Lancet paper. The increase in UK mesothelioma cases, projected to peak in 2013-2017, is being driven by the continuing exposure to asbestos, particularly amosite, in the construction industry, until the 1980's. Although the 2003 investigation of naval dockyard workers, showing a peak in the number of mesothelioma cases in 1991, is a single small study, the reduction in the number of cases of mesothelioma after 1991 is consistent with the measures taken to control asbestos exposures in the Royal Naval dockyards in the 1960's, through the replacement of asbestos by non-asbestos substitutes and the increasingly widespread use of respiratory protection. These observations suggest that the risk to Royal Naval personnel reduced some 10 years earlier than for those working in the construction industry. Unfortunately the case records of Royal Naval personnel with mesothelioma do not provide sufficient information to know about their particular occupations and how many had subsequently worked in construction trades; a robust estimate of the future burden of mesothelioma is therefore difficult.

4. At present there are about 70 war disablement pensions being paid in life to veterans from the three services. Compared with the projections this number is small. Defence Statistics (DS) data show that over the period 2004-2014, the numbers of cases of mesothelioma receiving War Pension has ranged from 53 in 2004 to 73 in 2014. This is about a third of cases projected over the same

period. Similarly the number of new awards each year has fluctuated between 18 in 2007 to a high of 40 in 2011. The average age of war pensioners with mesothelioma over the period has remained stable at 75 years. There are limits to these data including human error e.g. incorrect diagnosis entered. The cases were identified by Defence Statistics using the medical diagnosis code field and the free text field so that some records could have been missed. It is also true that a deceased person may still be entered on the data base while the estate is being administered. Data on numbers of war widow(er)s' benefits paid where the deceased has died from mesothelioma are not available; information is not collected on the basis of cause of death of spouse.

5. There are several possible explanations for the small DS numbers as compared with Professor Peto's projections. These include failure to claim because of lack of awareness of the Scheme or, in the individual case, of a possible service source of asbestos exposure. It may be that sufferers and their families have other priorities, given the inexorable rapid decline in the sufferer's health. In line with its campaign, the Legion has issued an alert to their officers, members and volunteers highlighting the War Pensions provisions for asbestos related diseases. We are aware that a similar publicity campaign in the context of civilian work led to an increased number of successful claims for Industrial Injuries Disablement benefit.